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PREFACE.

In working the Exercises in the latter half of this book, I have had abundant evidence of the superior advantages of the *Unitary Method* as compared with the processes ot statement by the *Rule of Three*, Simple and Compound. I have not found a single Example in which the steps necessary for a solution by the French system presented the slightest difficulty. That the Unitary Method is gaining ground rapidly in this country I cannot doubt, and I believe that the sanction of H. M. Inspectors of Schools is all that is now required to make the adoption of the System general throughout England.

J. HAMBLIN SMITH.

CAMBRIDGE, *January* 1876.

CONTENTS.

PURE ARITHMETIC.

SECT. PAGE
I. ON THE METHOD OF REPRESENTING NUMBERS BY FIGURES (EX. I—III) 1
II. ADDITION (EX. IV) 3
III. SUBTRACTION (EX. V) 4
IV. MULTIPLICATION (EX. VI—X) 4
V. DIVISION (EX. XI—XIV) 11
VI. ON THE RESOLUTION OF NUMBERS INTO FACTORS (EX. XV—XVIII) 19
VII. INEXACT DIVISION (EX. XIX—XXI) 22
VIII. HIGHEST COMMON FACTOR (EX. XXII—XXIV) 30
IX. LOWEST COMMON MULTIPLE (EX. XXV, XXVI) 35
X. FRACTIONS (EX. XXVII—XXXIX) 48
XI. DECIMAL FRACTIONS (EX. XL—LII) 60
XII. SQUARE ROOT (EX. LIII—LVI).. 78
XIII. CUBE ROOT (EX. LVII—LX) 86
MISCELLANEOUS EXAMPLES (EX. LXI) 100

COMMERCIAL ARITHMETIC.

SECT. PAGE

XIV. ON ENGLISH MONEY (EX. LXII—LXXIV) 104

XV. ON MEASURES OF TIME, LENGTH, SURFACE, SOLIDITY, CAPACITY AND WEIGHT (EX. LXXV—LXXXIV) 120

XVI. FRACTIONAL MEASURES (EX. LXXXV, LXXXVI) .. 136

XVII. DECIMAL MEASURES (EX. LXXXVII—LXXXIX) .. 139

XVIII. DECIMAL COINAGE (EX. XC, XCI) 146

XIX. PRACTICE (EX. XCII—XCIV) 149

XX. PROBLEMS AND THE UNITARY METHOD (EX. XCV—CI) 162

XXI. SIMPLE INTEREST (EX. CII—CVI) 176

XXII. COMPOUND INTEREST (EX. CVII—CIX) 182

XXIII. PRESENT WORTH AND DISCOUNT (EX. CX—CXII) 187

XXIV. AVERAGES AND PERCENTAGES (EX. CXIII, CXIV) 191

XXV. PROFIT AND LOSS (EX. CXV) 192

XXVI. STOCKS AND SHARES (EX. CXVI, CXVII) 194

RATIO AND PROPORTION (EX. CXVIII) 197

XXVII. DIVISION INTO PROPORTIONAL PARTS (EX. CXIX—CXXI) 199

XXVIII. EQUATION OF PAYMENTS (EX. CXXII) 203

XXIX. EXCHANGE (EX. CXXIII) 203

XXX. MEASUREMENT OF AREA (EX. CXXIV—CXXVII) .. 205

XXXI. MEASUREMENT OF SOLIDITY (EX. CXXVIII) 211

EXAMINATION PAPERS 213

KEY TO ARITHMETIC.

Ex. (1), p. 5.

(1) Seven; thirteen; forty-five; fifty-nine; three hundred and twenty-six; four thousand, five hundred and seventy-eight.

(2) Ninety; one hundred and ten; two hundred and seven; four thousand, three hundred; four thousand and thirty-six; four thousand, three hundred and six.

(3) Seven hundred and eighty; six hundred and nine; five thousand, three hundred and sixty; two thousand and twenty; one thousand, one hundred and one.

(4) Thirty-six thousand, four hundred and ninety-seven; forty-nine thousand, five hundred and thirty-two; six hundred and fifty-four thousand, three hundred and twenty-one; seven hundred and forty-three thousand, two hundred and sixty-nine.

(5) Forty-five thousand; thirty-two thousand, six hundred; seventy-five thousand, two hundred and thirty; five hundred thousand.

(6) Eight millions, five hundred and seventy-two thousand, nine hundred and fourteen; three millions, four hundred and sixty-nine thousand, two hundred and eighteen; four millions, six hundred and twenty-nine thousand, eight hundred and seventeen.

(7) Nine millions; twenty-nine millions; seven hundred and fifteen millions.

(8) Nine hundred and ten millions, three hundred and seven thousand, two hundred and forty; three hundred and seven millions, four thousand, two hundred and five; three hundred and eighty millions, five hundred and three thousand and forty.

(9) Two hundred and forty-three thousand seven hundred and fifty-nine millions, two hundred and sixty-eight thousand, three hundred and forty-two; three hundred and seven thousand, four hundred and five millions, six thousand, two hundred and seventy.

(10) Four hundred and seventeen billions, two hundred and thirty-five thousand, six hundred and eighty-two millions, seven hundred and nineteen thousand, four hundred and thirty-five; two hundred and three billions, fifty-six thousand three hundred millions, seventy-two thousand and ten.

Ex. (ii), p. 6.

(1) 9, 12, 17, 19, 13, 16, 11.
(2) 23, 27, 35, 38, 44, 40, 26, 34.
(3) 67, 75, 62, 83, 74, 92, 68, 95.
(4) 76, 22, 50, 15, 28, 61, 49, 18, 90, 73.
(5) 107, 130, 246, 372, 608, 740, 990.
(6) 836, 747, 410, 913, 750, 384.
(7) 818, 808, 206, 430, 512, 787.
(8) 7845, 9637, 12 000, 8400, 6003, 85 040.
(9) 5470, 3650, 8780, 1247, 4808.
(10) 6004, 7022, 3500, 9047, 2017, 19 402.
(11) 70 007, 60 060, 14 014, 70 017, 12 303, 16 005.
(12) 356 728, 640 842, 900 000, 800 040.
(13) 7 000 000, 4 576 865, 75 806 940.
(14) 315 000 000, 5 040 000, 8 000 700, 18 000 020, 700 000 002.
(15) 315 674 018 003, 35 600 000 520.
(16) 7 000 000 000 000, 5 800 000 600 047, 8 000 000 043 007.
(17) 305 005 004 006 003, 53 000 053 053 053.
(18) 9 000 000 000 009, 90 000 000 000 900, 19 000 000 019 000, 1 000 001 001 101.

Ex. (iii), p. 9.

1.

(1) Twenty-seven. (2) Forty-nine. (3) Sixty-eight.
(4) Seventy-three. (5) Ninety-two.
(6) One hundred and forty-four.
(7) One hundred and sixty-three.

(8) One hundred and ninety-nine.
(9) Six hundred and sixty-four.
(10) One thousand eight hundred and seventy-two.

2.

(1) XXXVII. (2) LIX. (3) LXII.
(4) LXXXVII. (5) XCV. (6) CXXXIX.
(7) CXLV. (8) CLXXIX. (9) DCCCXLVI.
(10) MDCCLXIII.

Ex. (iv), p. 10.

(1) 11, 16, 20, 36. (2) 98. (3) 67.
(4) 60. (5) 1409. (6) 949.
(7) 738. (8) 4971. (9) 23 406.
(10) 74 338. (11) 2008. (12) 3310.
(13) 1671. (14) 880. (15) 28 493.
(16) 33 633. (17) 28 206. (18) 18 526.
(19) 208. (20) 1163. (21) 9289.
(22) 12 932. (23) 106 384. (24) 59 313.
(25) 284 271. (26) 1 450 741. (27) 680 077 891
(28) 1 843 088. (29) 1 979 628. (30) 1 184 946.
(31) 3 782 272. (32) 3 476 908. (33) 799 819.
(34) 50 333 150. (35) 20 826 857. (36) 14 621 293.

(37)
$$\begin{array}{r}740\\40015\\647\\53303\\17546\\\hline 112251\end{array}$$

(38)
$$\begin{array}{r}508\\6009\\55014\\819\\700006\\2012\\\hline 764368\end{array}$$

(39)
$$\begin{array}{r}645845\\70047\\60040\\750000\\300015\\\hline 1825947\end{array}$$

(40)
$$\begin{array}{r}201096342\\54304\\18006003\\500040\\8000008\\\hline 227656697\end{array}$$

Ex. (v), p. 14.

(1) 7. (2) 8. (3) 19. (4) 29.
(5) 34. (6) 54. (7) 35. (8) 29.
(9) 45. (10) 66. (11) 509. (12) 82.
(13) 3808. (14) 2112. (15) 4228. (16) 6222.
(17) 61 471. (18) 108. (19) 2779. (20) 28 828.
(21) 2761. (22) 381. (23) 46. (24) 32.
(25) 2042. (26) 6457. (27) 5780. (28) 51 195.
(29) 10 999. (30) 1096. (31) 18 467. (32) 60 023.
(33) 775 772. (34) 1.

(35) $$\begin{array}{r}1000000\\1000\\\hline 999000\end{array}$$

(36) $$\begin{array}{r}100000000\\100000\\\hline 99900000\end{array}$$

(37) $$\begin{array}{r}10000000000\\1001\\\hline 9999998999\end{array}$$

(38) $$\begin{array}{r}26\\18\\\hline 8\end{array}$$

(39) $$\begin{array}{r}427\\401\\\hline 26\end{array}$$

(40) $$\begin{array}{r}3015\\2405\\\hline 610\end{array}$$

(41) $$\begin{array}{r}1000\\407\\\hline 593\end{array}$$

(42) $$\begin{array}{r}586\\427\\\hline 159\end{array}$$

(43) $$\begin{array}{r}8047\\7428\\\hline 619\end{array}$$

Ex. (vi), p. 18.

(1) 45. (2) 304. (3) 490. (4) 870
(5) 684. (6) 861. (7) 9273. (8) 11364.
(9) 50, 75, 175, 225.
(10) 635, 1016, 1270, 1397, 2540, 8890.
(11) 9868, 14 802, 27 137, 29 604. 1 233 500, 17 269 000.
(12) 336861, 411719, 449148, 1871450000, 2994320000000.

Ex. (vii), p. 19.

(1) $$\begin{array}{r}23\\15\\\hline 115\\23\\\hline 345\end{array}$$

(2) $$\begin{array}{r}37\\29\\\hline 333\\74\\\hline 1073\end{array}$$

(3) $$\begin{array}{r}45\\36\\\hline 270\\135\\\hline 1620\end{array}$$

(4) $$\begin{array}{r}70\\26\\\hline 420\\140\\\hline 1820\end{array}$$

(5) $\begin{array}{r} 125 \\ 24 \\ \hline 500 \\ 250 \\ \hline 3000 \end{array}$ (6) $\begin{array}{r} 327 \\ 42 \\ \hline 654 \\ 1308 \\ \hline 13734 \end{array}$ (7) $\begin{array}{r} 205 \\ 43 \\ \hline 615 \\ 820 \\ \hline 8815 \end{array}$

(8) $\begin{array}{r} 307 \\ 98 \\ \hline 2456 \\ 2763 \\ \hline 30086 \end{array}$ (9) $\begin{array}{r} 2684 \\ 35 \\ \hline 13420 \\ 8052 \\ \hline 93940 \end{array}$ (10) $\begin{array}{r} 57296 \\ 27 \\ \hline 401072 \\ 114592 \\ \hline 1546992 \end{array}$

(11) $\begin{array}{r} 84293 \\ 88 \\ \hline 674344 \\ 674344 \\ \hline 7417784 \end{array}$ (12) $\begin{array}{r} 7629302 \\ 76 \\ \hline 45775812 \\ 53405114 \\ \hline 579826952 \end{array}$

Ex. (viii), p. 20.

(1) $\begin{array}{r} 326 \\ 532 \\ \hline 652 \\ 978 \\ 1630 \\ \hline 173432 \end{array}$ (2) $\begin{array}{r} 704 \\ 176 \\ \hline 4224 \\ 4928 \\ 704 \\ \hline 123904 \end{array}$ (3) $\begin{array}{r} 809 \\ 506 \\ \hline 4854 \\ 4045 \\ \hline 409354 \end{array}$

(4) $\begin{array}{r} 917 \\ 406 \\ \hline 5502 \\ 3668 \\ \hline 372302 \end{array}$ (5) $\begin{array}{r} 5376 \\ 423 \\ \hline 16128 \\ 10752 \\ 21504 \\ \hline 2274048 \end{array}$ (6) $\begin{array}{r} 7846 \\ 340 \\ \hline 313840 \\ 23538 \\ \hline 2667640 \end{array}$

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39342154

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685112
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428195
51212122

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319208
319766614

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152847420

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58376823669

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348087421500

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6790364
3880208
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3340400440

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609435012763918

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13426705851000

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2969396
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3471768
3590386740

(20)
428734
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2143670
3429872
3454309838

(21)
984236
5009
8858124
4921180
4930038124

(22)
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70043
2617407
3489876
6107283
61110346167

(23)
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36479
3471336
2699928
1542816
2314224
1157112
14070096216

(24)
423796
57243
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1695184
847592
2966572
2118980
24259354428

(25)
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400205
3100360
1240144
2480288
248155914760

(26)
270403
502049
2433627
1081612
540806
1352015
135755555747

(27)
427964
582978
3423712
2995748
3851676
855928
3423712
2139820
249493596792

Ex. (ix), p. 21.

(1)
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    18
    19
  ----
   162
   18
  ----
   342
    20
  ----
  6840
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(2)
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     436
      73
  ------
    1308
   3052
  ------
   31828
      12
  ------
  381936
       5
  ------
 1909680
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(3)
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             3476
             2300
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          1042800
         6952
          -------
          7994800
            70010
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         79948000
       55963600
     ------------
     559715948000
             2003
   --------------
    1679147844000
  1119431896000
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 1121111043844000
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Ex. (x), p. 22.

(1)
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   15
   15
  ---
   75
  15
  ---
  225
```

(2)
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   24
   24
  ---
   96
  48
  ---
  576
```

(3)
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    40
    40
  ----
  1600
```

(4)
```
    57
    57
  ----
   399
  285
  ----
  3249
```

(5)
```
    69
    69
  ----
   621
  414
  ----
  4761
```

(6)
```
    72
    72
  ----
   144
  504
  ----
  5184
```

(7)
$$\begin{array}{r} 87 \\ 87 \\ \hline 609 \\ 696 \\ \hline 7569 \end{array}$$

(8)
$$\begin{array}{r} 100 \\ 100 \\ \hline 10000 \end{array}$$

(9)
$$\begin{array}{r} 114 \\ 114 \\ \hline 456 \\ 114 \\ 114 \\ \hline 12996 \end{array}$$

(10)
$$\begin{array}{r} 237 \\ 237 \\ \hline 1659 \\ 711 \\ 474 \\ \hline 56169 \end{array}$$

(11)
$$\begin{array}{r} 625 \\ 625 \\ \hline 3125 \\ 1250 \\ 3750 \\ \hline 390625 \end{array}$$

(12)
$$\begin{array}{r} 897 \\ 897 \\ \hline 6279 \\ 8073 \\ 7176 \\ \hline 804609 \end{array}$$

(13)
$$\begin{array}{r} 789 \\ 789 \\ \hline 7101 \\ 6312 \\ 5523 \\ \hline 622521 \end{array}$$

(14)
$$\begin{array}{r} 11 \\ 11 \\ \hline 121 \\ 11 \\ \hline 1331 \end{array}$$

(15)
$$\begin{array}{r} 13 \\ 13 \\ \hline 169 \\ 13 \\ \hline 507 \\ 169 \\ \hline 2197 \end{array}$$

(16)
$$\begin{array}{r} 25 \\ 25 \\ \hline 125 \\ 50 \\ \hline 625 \\ 25 \\ \hline 3125 \\ 1250 \\ \hline 15625 \end{array}$$

(17)
$$\begin{array}{r} 47 \\ 47 \\ \hline 329 \\ 188 \\ \hline 2209 \\ 47 \\ \hline 15463 \\ 8836 \\ \hline 103823 \end{array}$$

(18)
$$\begin{array}{r} 68 \\ 68 \\ \hline 544 \\ 408 \\ \hline 4624 \\ 68 \\ \hline 36992 \\ 27744 \\ \hline 314432 \end{array}$$

(19) 93
93
279
837
8649
93
25947
77841
804357

(20) 100
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10000
100
1000000

(21) 257
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1285
514
66049
257
462343
330245
132098
16974593

(22) 356
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760416
633680
380208
45118016

(23) 539
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1617
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1452605
156590819

(24) 704
704
2816
4928
495616
704
1982464
3469312
348913664

(25) 987
987
6909
7896
8883
974169
987
6819183
7793352
8767521
961504803

Ex. (xi), p. 25.

(1) 3. (2) 3. (3) 12. (4) 11.

(5) 13) 182 (14
13
52
52

(6) 17) 238 (14
17
68
68

(7) 19) 456 (24
38
76
76

(8) 36) 3708 (103
36
108
108

(9) 37) 3996 (108
37
296
296

(10) 493) 6409 (13
493
1479
1479

(11) 817) 431376 (528
4085
2287
1634
6536
6536

(12) 946) 976272 (1032
946
3027
2838
1892
1892

(13) 342) 19249470 (56285
1710
2149
2052
974
684
2907
2736
1710
1710

(14) 358) 86366784 (241248
716
1476
1432
446
358
887
716
1718
1432
2864
2864

(15) 489) 224009433 (458097
1956
2840
2445
3959
3912
4743
4401
3423
3423

(16) 618) 4690325214 (7589523
4326
3643
3090
5532
4944
5885
5562
3232
3090
1421
1236
1854
1854

(17) 1369) 2880376 (2104
2738
1423
1369
5476
5476

(18) 6142) 107810526 (17553
6142
46390
42994
33965
30710
32552
30710
18426
18426

(19) 4123) 98955005667 (24000729
8246
16495
16492
30056
28861
11956
8246
37107
37107

```
(20)  2019) 4076361 ( 2019
            4038
            ----
             3836
             2019
             -----
             18171
             18171
             -----
```

```
(21)  237) 13312053 ( 56169
           1185
           ----
            1462
            1422
            ----
              400
              237
              ----
              1635
              1422
              ----
               2133
               2133
               ----
```

```
(22)  89) 505350366 ( 5678094
          445
          ---
           603
           534
           ---
            695
            623
            ---
             720
             712
             ---
              836
              801
              ---
               356
               356
               ---
```

```
(23)  83) 360919856 ( 4348432
          332
          ---
           289
           249
           ---
            401
            332
            ---
             699
             664
             ---
              358
              332
              ---
               265
               249
               ---
                166
                166
                ---
```

```
(24)  907) 4600304 ( 5072
           4535
           ----
            6530
            6349
            ----
             1814
             1814
             ----
```

```
(25)  689) 218860161 ( 317649
           2067
           ----
            1216
             689
            ----
             5270
             4823
             ----
              4471
              4134
              ----
               3376
               2756
               ----
                6201
                6201
                ----
```

```
(26)  861 ) 337103025 ( 391525
            2583
            ----
             7880
             7749
             ----
              1313
               861
              ----
               4520
               4305
               ----
                2152
                1722
                ----
                 4305
                 4305
                 ----
```

```
(27)  1001 ) 39916424548 ( 39876548
             3003
             ----
              9886
              9009
              ----
               8774
               8008
               ----
                7662
                7007
                ----
                 6554
                 6006
                 ----
                  5485
                  5005
                  ----
                   4804
                   4004
                   ----
                    8008
                    8008
                    ----
```

```
(28)  5060 ) 152847420 (30207
             15180
             -----
              10474
              10120
              -----
                35420
                35420
                -----
```

```
(29)  7649) 26540538445 (3469805
            22947
            -----
             35935
             30596
             -----
              53393
              45894
              -----
               74998
               68841
               -----
                61574
                61192
                -----
                  38245
                  38245
                  -----
```

```
(30)  17072) 1165584398000 (68274625
             102432
             ------
              141264
              136576
              ------
                46883
                34144
                -----
                127399
                119504
                ------
                  78958
                  68288
                  -----
                  106700
                  102432
                  ------
                    42680
                    34144
                    -----
                     85360
                     85360
                     -----
```

```
(31)  74291) 35088008823434 (472304974
             297164
             ------
              537160
              520037
              ------
               171238
               148582
               ------
                226568
                222873
                ------
                  369523
                  297164
                  ------
                   723594
                   668619
                   ------
                    549753
                    520037
                    ------
                     297164
                     297164
                     ------
```

```
(32)   65432)3691870220851 12(5642300741
             327160
             ------
              420270
              392592
              ------
               276782
               261728
               ------
                150542
                130864
                ------
                 196780
                 196296
                 ------
                   484851
                   458024
                   ------
                    268271
                    261728
                    ------
                      65432
                      65432
                      -----

(33)   98989)8377413561 52459(8462974231
             791912
             ------
             458293
             395956
             ------
              623375
              593934
              ------
               294416
               197978
               ------
                964381
                890901
                ------
                 734805
                 692923
                 ------
                  418822
                  395956
                  ------
                   228664
                   197978
                   ------
                    306865
                    296967
                    ------
                      98989
                      98989
                      -----
```

(34) 642867) 583768236669 (90807
5785803

5187936
5142936

4500069
4500069

(35) 9864302) 2959990965442 (300071
29592906

70036544
69050114

9864302
9864302

(36) 8723694) 261449109180 (29970
17447388

86975229
78513246

84619831
78513246

61065858
61065858

Ex. (xii), p. 25.

(1) 342) 1171692 (3426
1026

1456
1368

889
684

2052
2052

(2) 23) 149201 (6487
138

112
92

200
184

161
161

(3)
64852
987

453964
518816
583668

64008924

Ex. (xiii), p. 27.

(1) 2|7652
3826

(2) 3|725961
241987

(3) 4|8650232
2162558

(4) 5|8749320
1749864

(5) 6|7463424
1243904

(6) 7|3504221
500603

(7) 9|713406960
79267440

(8) 11|4362017
396547

(9) 12|7912464
659372

(10) 9|40006230709905
4445136745545

(11) 11|7642300721
694754611

(12) 12|36089882405604
3007490200467

(13) 2|4263924
2131962

3|4263924
1421308

4|4263924
1065981

(14) 2|620437548
310218774

3|620437548
206812516

4|620437548
155109387

(15) 2|27540918264
13770459132

3|27540918264
9180306088

4|27540918264
6885229566

(16) 5|46528920
9305784

8|46528920
5816115

9|46528920
5169880

(17)	$5\underline{\vert 981754200}$ 196350840	$8\underline{\vert 981754200}$ 122719275	$9\underline{\vert 981754200}$ 109083800
(18)	$5\underline{\vert 234567000}$ 46913400	$8\underline{\vert 234567000}$ 29320875	$9\underline{\vert 234567000}$ 26063000
(19)	$7\underline{\vert 7971348}$ 1138764	$11\underline{\vert 7971348}$ 724668	$12\underline{\vert 7971348}$ 664279
(20)	$7\underline{\vert 29574468}$ 4224924	$11\underline{\vert 29574468}$ 2688588	$12\underline{\vert 29574468}$ 2464539
(21)	$7\underline{\vert 6736387812}$ 962341116	$11\underline{\vert 6736387812}$ 612398892	$12\underline{\vert 6736387812}$ 561365651

Ex. (xiv), p. 28.

(1)
$$\begin{array}{r} 27543 \\ 497 \\ \hline 192801 \\ 247887 \\ 110172 \\ \hline 13688871 \end{array}$$

(2)
$$\begin{array}{r} 34682 \\ 4021 \\ \hline 34682 \\ 69364 \\ 138728 \\ \hline 139456322 \end{array}$$

(3)
$$\begin{array}{r} 7549 \\ 206 \\ \hline 45294 \\ 15098 \\ \hline 1555094 \end{array}$$

(4)
$$\begin{array}{r} 20051 \\ 3070 \\ \hline 1403570 \\ 60153 \\ \hline 61556570 \end{array}$$

(5)
$$\begin{array}{r} 4372 \\ 2483 \\ \hline 13116 \\ 34976 \\ 17488 \\ 8744 \\ \hline 10855676 \end{array}$$

(6)
$$\begin{array}{r} 5072 \\ 3123 \\ \hline 15216 \\ 10144 \\ 5072 \\ 15216 \\ \hline 15839856 \end{array}$$

Ex. (xv), p. 30.

(1) 3, 9.
(2) 2, 3, 4, 8, 9.
(3) 3, 5, 9, 11.
(4) 2, 3, 5, 10.
(5) 2, 3, 4, 8, 9.
(6) 3, 5, 9.
(7) 2, 4, 8.
(8) 5.
(9) 2, 3, 4.
(10) 2, 3, 4, 5, 8, 9. 10.
(11) 2, 11.

Ex. (xvi), p. 30.

(1) 2, 3, 3. (2) 2, 2, 2, 3. (3) 3, 3, 3.
(4) 2, 2, 2, 2, 2. (5) 2, 2, 3, 3. (6) 3, 13.
(7) 2, 3, 7. (8) 3, 17. (9) 2, 3, 3, 3.
(10) 3, 19. (11) 2, 2, 2, 3, 3. (12) 5, 17.
(13) 7, 13. (14) 3, 3, 11. (15) 2, 2, 5, 5.
(16) 3, 5, 7. (17) 2, 2, 3, 3, 3. (18) 2, 2, 2, 2, 7.
(19) 2, 2, 3, 11. (20) 2, 2, 2, 2, 11.
(21) 2, 2, 2, 2, 2, 3, 3. (22) 2, 2, 2, 2, 3, 3, 3.
(23) 3, 5, 5, 7. (24) 5, 5, 5, 5. (25) 3, 3, 3, 3, 3, 3.
(26) 3, 3, 3, 37. (27) 2, 2, 2, 2, 3, 3, 3, 3.
(28) 2, 2, 2, 2, 2, 5, 11. (29) 2, 2, 2, 2, 2, 2, 2, 3, 3, 5.

Ex. (xvii), p. 31.

(1)	(2)	(3)	(4)
347	423	5462	8497
7	11	9	9
2429	4653	49158	76473
2	2	3	4
4858	9306	147474	305892

(5)	(6)	(7)	(8)
8573	28472	49273	90728
7	8	9	12
60011	227776	443457	1088736
7	7	7	11
420077	1594432	3104199	11976096

(9)	(10)	(11)	(12)
90725	40207	36729	704075
12	12	12	12
1088700	482484	440748	8448900
3	9	11	12
3266100	4342356	4848228	101386800
10		10	100
32661000		8482280	10138680000

Ex. (xviii), p. 32.

(1)
$$\begin{array}{r|r} 2 & 34608 \\ \hline 7 & 17304 \\ \hline & 2472 \end{array}$$

(2)
$$\begin{array}{r|r} 3 & 6791040 \\ \hline 5 & 2263680 \\ \hline & 452736 \end{array}$$

(3)
$$\begin{array}{r|r} 3 & 752364576 \\ \hline 6 & 250788192 \\ \hline & 41798032 \end{array}$$

(4)
$$\begin{array}{r|r} 9 & 1143995886 \\ \hline 3 & 127110654 \\ \hline & 42370218 \end{array}$$

(5)
$$\begin{array}{r|r} 11 & 285216822 \\ \hline 3 & 25928802 \\ \hline & 8642934 \end{array}$$

(6)
$$\begin{array}{r|r} 7 & 2095501072 \\ \hline 7 & 299357296 \\ \hline & 42765328 \end{array}$$

(7)
$$\begin{array}{r|r} 8 & 4157028792 \\ \hline 7 & 519628599 \\ \hline & 74232657 \end{array}$$

(8)
$$\begin{array}{r|r} 12 & 1200130008 \\ \hline 7 & 100010834 \\ \hline & 14287262 \end{array}$$

(9)
$$\begin{array}{r|r} 9 & 22039992 \\ \hline 12 & 2448888 \\ \hline & 204074 \end{array}$$

(10)
$$\begin{array}{r|r} 12 & 57667632 \\ \hline 11 & 4805636 \\ \hline & 436876 \end{array}$$

(11)
$$\begin{array}{r|r} 5 & 472634500 \\ \hline 5 & 94526900 \\ \hline 5 & 18905380 \\ \hline & 3781076 \end{array}$$

(12)
$$\begin{array}{r|r} 10 & 565184160 \\ \hline 8 & 56518416 \\ \hline 9 & 7064802 \\ \hline & 784978 \end{array}$$

(13)
$$\begin{array}{r|r} 100 & 537062400 \\ \hline 12 & 5370624 \\ \hline 12 & 447552 \\ \hline & 37296 \end{array}$$

Ex. (xix), p. 33.

(1) 37) 3492 (94
333
162
148
14

(2) 41) 486296 (11860
41
76
41
352
328
249
246
36

(3) 47) 872968 (18573
47
402
376
269
235
346
329
178
141
37

(4) 65) 57092 (878
520
509
455
542
520
22

(5) 71) 7492736 (105531
71
392
355
377
355
223
213
106
71
35

(6) 98) 82749325 (844380
784
434
392
429
392
373
294
792
784
85

```
(7)  103 ) 87467 ( 849
           824
           ---
            506
            412
            ---
             947
             927
             ---
              20
```

```
(8)  409 ) 978462 ( 2392
           818
           ----
           1604
           1227
           ----
            3776
            3681
            ----
              952
              818
              ---
              134
```

```
(9)  723 ) 8276253 ( 11447
           723
           ----
           1046
            723
           ----
            3232
            2892
            ----
             3405
             2892
             ----
              5133
              5061
              ----
                72
```

```
(10)  1009 ) 974004562 ( 965316
             9081
             ----
              6590
              6054
              ----
               5364
               5045
               ----
                3195
                3027
                ----
                 1686
                 1009
                 ----
                  6772
                  6054
                  ----
                   718
```

```
(11)  4821 ) 48237654 ( 10005
             4821
             -----
                27654
                24105
                -----
                 3549
```

(12) 6871) 68725642903 (10002276
6871
15642
13742
19009
13742
52670
48097
45733
41226
4507

Ex. (xx), p. 33.

(1) 3 | 4153
5 | 1384 and 1 unit over.
276 and 4 parcels of 3 units, or 12 units over.

(2) 4 | 587595
4 | 146898 and 3 units over.
36724 and 2 parcels of 4 units, or 8 units over.

(3) 9 | 42813
2 | 4757 and no units over.
2378 and 1 parcel of 9 units over.

(4) 7 | 423672
3 | 60524 and 4 units over.
20174 and 2 parcels of 7 units, or 14 units over.

(5) 5 | 724972
5 | 144994 and 2 units over.
28998 and 4 parcels of 5 units, or 20 units over.

(6) 9 | 569024971
3 | 63224996 and 7 units over.
21074998 and 2 parcels of 9 units, or 18 units over.

(7) 3 | 2825780
11 | 941926 and 2 units over.
85629 and 7 parcels of 3 units, or 21 units over.

(8) 7 | 8642396
5 | 1234628 and no units over.
246925 and 3 parcels of 7 units, or, 21 units over.

(9) 6 | 356599
8 | 59433 and 1 unit over.
7429 and 1 parcel of 6 units over.

(10) 8 | 8274913
8 | 1034364 and 1 unit over.
129295 and 4 parcels of 8 units, or, 32 units over.

(11) 11 | 230047914
7 | 20913446 and 8 units over.
2987635 and 1 parcel of 11 units over.

(12) 11 | 419421
9 | 38129 and 2 units over.
4236 and 5 parcels of 11 units, or, 55 units over.

(13) 7 | 44487
3 | 6355 and 2 units over.
5 | 2118 and 1 parcel of 7 units over.
423 and 3 parcels of 21 units, or 63 units over.

(14)
$$\begin{array}{r|rl}
9 & 95379 & \\ \cline{2-2}
7 & 10597 & \text{and 6 units over.} \\ \cline{2-2}
3 & 1513 & \text{and 6 parcels of 9 units, or, 54 units over.} \\ \cline{2-2}
\multicolumn{1}{r}{} & 504 & \text{and 1 parcel of 63 units over.}
\end{array}$$

(15)
$$\begin{array}{r|rl}
10 & 1194477 & \\ \cline{2-2}
7 & 119447 & \text{and 7 units over.} \\ \cline{2-2}
3 & 17063 & \text{and 6 parcels of 10 units, or, 60 units over.} \\ \cline{2-2}
\multicolumn{1}{r}{} & 5687 & \text{and 2 parcels of 70 units, or, 140 units over.}
\end{array}$$

Ex. (xxi), p. 35.

(1) Remainder $= 4276 - (171 \times 25) = 4276 - 4275 = 1.$

(2) Dividend $= (1381 \times 342) + 67 = 472302 + 67 = 4723069.$

(3) Quotient $= (372149 - 245) \div 596 = 371904 \div 596 = 624.$

(4) Divisor $= (8765237 - 317) \div 2910 = 8764920 \div 2910 = 3012.$

Examination Papers, p. 35.

(A)

(1) Four millions, two hundred and thirty-seven thousand, four hundred and ninety-six; 653812.

(2)
$$\begin{array}{r}
24753 \\
86729 \\
4237 \\
80462 \\ \hline
196181
\end{array}$$

(3)
$$\begin{array}{r}
86293 \\
78464 \\ \hline
7829
\end{array}$$

(4)
$$\begin{array}{r}
8627 \\
493 \\ \hline
25881 \\
77643 \\
34508 \\ \hline
4253111
\end{array}$$

(4)
$$\begin{array}{r}
50042 \\
307 \\ \hline
350294 \\
150126 \\ \hline
15362894
\end{array}$$

(5) 9 | 8423793

935977

(5) 358) 2659582 (7429

2506

1535

1432

1038

716

3222

3222

(B)

(1) 25257630; four hundred and two millions, fifty thousand four hundred and seven.

(2) 17000017

8008

16992009

(3) 6549

4037

45843

19647

26196

26438313

(4) 96) 32456789 (338091

288

365

288

776

768

878

864

149

96

53

(3) 27004

3700

18902800

81012

99914800

(4) 8 | 32456789

12 | 4057098 and 5 units over.

338091 and 6 parcels of 8 units over.

(5)

```
  1000006
    15011
   100010
    60400
  -------
9| 1175427
  -------
   130603
```

(C)

(1) Ten thousand and ten millions, two hundred and one thousand, four hundred and one; 1023001

```
10010201401        10011224402
    1023001        10009178400
-----------        -----------
10011224402            2046002
```

(2)

```
    740296             426004
      2089               3704
   -------            -------
   6662664            1704016
  5922368            2982028
 1480592            1278012
----------         ----------
1546478344         1577918816
```

(3)

```
5| 78297426
  ---------
7| 15659485 and 1 unit over.
  ---------
    2237069 and 2 parcels of 5 units over.
```

(4)

```
126406003
 95000004
---------
 31405999
```

(5)

```
   723
   347
  ----
  5061
 2892
2169
------
250881
```

(5)

```
 4| 250881
   -------
12|  62720 and 1 unit over
   -------
     5226 and 8 parcels of 4 units over.
```

(D)

(1) 1888

(2)
$$\begin{array}{r|l} 12 & 987654321 \\ \hline 11 & 82304526 \text{ and 9 units over.} \\ \hline & 7482229 \text{ and 7 parcels of 12 units over.} \end{array}$$

(3)
$56 = 2 \times 2 \times 2 \times 7$
$78 = 2 \times 3 \times 13$
$114 = 2 \times 3 \times 19$

(4)
$$\begin{array}{r} 86297 \\ 40025 \\ \hline 126322 \\ 95 \\ \hline 631610 \\ 1136898 \\ \hline 12000590 \end{array} \qquad \begin{array}{r} 789 \\ 694 \\ \hline 95 \end{array}$$

(5)
$$\begin{array}{r} 1000000 \\ 101 \\ \hline 999899 \end{array}$$

(E)

(1)
$$\begin{array}{lrl}
5406\,) & 353008972602 & (\,65299476 \\
 & 32436 & \\ \cline{2-2}
 & 28648 & \\
 & 27030 & \\ \cline{2-2}
 & 16189 & \\
 & 10812 & \\ \cline{2-2}
 & 53777 & \\
 & 48654 & \\ \cline{2-2}
 & 51232 & \\
 & 48654 & \\ \cline{2-2}
 & 25786 & \\
 & 21624 & \\ \cline{2-2}
 & 41620 & \\
 & 37842 & \\ \cline{2-2}
 & 37782 & \\
 & 32436 & \\ \cline{2-2}
 & 5346 &
\end{array}$$

(2)

$$\begin{array}{r} 8976589 \\ 9876 \\ \hline 53859534 \\ 62836123 \\ 71812712 \\ 80789301 \\ \hline 88652792964 \end{array}$$

(3) $40 = 2 \times 2 \times 2 \times 5$
$90 = 2 \times 3 \times 3 \times 5$
$126 = 2 \times 3 \times 3 \times 7$

(4) XXIV, XLVII, CLXXVIII.

(5) $24 \times 500 = 12000$

Ex. (xxii), p. 37.

(1) $8 = 2 \times 4$
$14 = 2 \times 7$

(2) $12 = 6 \times 2$
$30 = 6 \times 5$

(3) $40 = 20 \times 2$
$60 = 20 \times 3$

(4) $36 = 18 \times 2$
$90 = 18 \times 5$

(5) $48 = 48 \times 1$
$144 = 48 \times 3$

(6) $7 = 7 \times 1$
$14 = 7 \times 2$
$21 = 7 \times 3$

(7) $15 = 3 \times 5$
$27 = 3 \times 9$
$105 = 3 \times 35$

(8) $32 = 16 \times 2$
$48 = 16 \times 3$
$128 = 16 \times 8$

(9) $16 = 16 \times 1$
$64 = 16 \times 4$
$256 = 16 \times 16$
$1024 = 16 \times 64$

(10) $24 = 3 \times 8$
$51 = 3 \times 17$
$105 = 3 \times 35$
$729 = 3 \times 243$

Ex. (xxiii), p. 38.

(1)

$$\begin{array}{llll}
384)\,1296\,(\,3 & & & \\
1152 & & & \\
\cline{1-1}
& 144)\,384\,(\,2 & & \\
& 288 & & \\
\cline{2-2}
& & 96)\,144\,(\,1 & \\
& & 96 & \\
\cline{3-3}
& & & 48)\,96\,(\,2 \\
& & & 96 \\
\cline{4-4}
\end{array}$$

∴ H. C. F. is 48.

```
(2)  2272) 3552 (1
           2272
           ----
           1280) 2272 (1
                 1280
                 ----
                  992) 1280 (1
                        992
                        ---
                        288) 992 (3
                             864
                             ---
                             128) 288 (2
                                  256
                                  ---
                                   32) 128 (4
                                       128
                                       ---
```

∴ H. C. F. is 32.

```
(3)  7455) 47223 (6
           44730
           -----
            2493) 7455 (2
                  4986
                  ----
                  2469) 2493 (1
                        2469
                        ----
                          24) 2469 (102
                              24
                              ----
                                69
                                48
                                --
                                21) 24 (1
                                    21
                                    --
                                     3) 21 (7
                                        21
                                        --
```

∴ H. C. F. is 3.

(4) 12321) 54345 (4
49284

5061) 12321 (2
10122

2199) 5061 (2
4398

663) 2199 (3
1989

210) 663 (3
630

33) 210 (6
198

12) 33 (2
24

9) 12 (1
9

3) 9 (3
9

∴ H. C. F. is 3.

(5) 6906) 10359 (1
6906

3453) 6906 (2
6906

∴ H. C. F. is 3453.

(6) 1908) 2736 (1
1908

828) 1908 (2
1656

252) 828 (3
756

72) 252 (3
216

36) 72 (2
72

∴ H. C. F. is 36.

(7) 49608) 169416 (3
148824

20592) 49608 (2
41184

8424) 20592 (2
16848

3744) 8424 (2
7488

936) 3744 (4
3744

∴ H. C. F. is 936.

(8) 40115) 126025 (3
120345

5680) 40115 (7
39760

355) 5680 (16
355

2130
2130

∴ H. C. F. is 355.

(9) 1581227) 16758766 (10
15812270

946496) 1581227 (1
946496

634731) 946496 (1
634731

311765) 634731 (2
623530

11201

11201) 311765 (27
22402

87745
78407

9338) 11201 (1
9338

1863) 9338 (5
9315

23) 1863 (81
184

23
23

∴ H. C. F. is 23.

```
(10) 35175) 236845 (6
            211050
            ------
             25795) 35175 (1
                    25795
                    -----
                     9380) 25795 (2
                           18760
                           -----
                            7035) 9380 (1
                                  7035
                                  ----
                                  2345) 7035 (3
     H. C. F. is 2345.                  7035
                                        ----
```

Ex. (xxiv), p. 39.

(1) The H. C. F. of 16 and 20 is 4
The H. C. F. of 4 and 28 is 4 } ∴ 4 is H. C. F.

(2) The H. C. F. of 14 and 42 is 14
The H. C. F. of 14 and 56 is 14 } ∴ 2 is H. C. F.
The H. C. F. of 14 and 138 is 2

```
(3) 365) 511 (1                  73) 803 (11
         365                         73
         ---                         --
         146) 365 (2                  73
              292                     73
              ---                     --
               73) 146 (2
                   146            ∴ H. C. F. is 73.
                   ---

(4) 232) 290 (1               58) 493 (8
         232                      464
         ---                      ---
          58) 232 (4               29) 58 (2
              232                      58
              ---                      --
                 ∴ H. C. F. is 29.
```

(5) 492) 1476 (3
1476
———

492) 1763 (3
1476
———
287) 492 (1
287
———
205) 287 (1
205
———
82) 205 (2
164
———
41) 82 (2
82
———

∴ H. C. F. is 41.

(6) 148) 444 (3
444
———

148) 592 (4
592
———

142) 703 (4
592
———
111) 148 (1
111
———
37) 111 (3
111
———

H. C. F. is 37.

Ex. (xxv), p. 40.

(1) $\left.\begin{aligned}27&=27\times1\\54&=27\times2\end{aligned}\right\}$ ∴ L. C. M. is 27×2, or, 54.

(2) $\left.\begin{aligned}88&=4\times22\\108&=4\times27\end{aligned}\right\}$ ∴ L. C. M. is $4\times22\times27$, or, 2376.

(3) $\left.\begin{aligned}633&=3\times211\\844&=4\times211\end{aligned}\right\}$ ∴ L. C. M. is $3\times211\times4$, or, 2532.

(4) $\left.\begin{aligned}195&=5\times39=5\times3\times13\\735&=5\times147=5\times3\times49\end{aligned}\right\}$ ∴ L. C. M. is $15\times13\times49$, or, 9555.

(5) $\left.\begin{aligned}1000&=5\times200=5\times5\times40=5\times5\times5\times8\\2125&=5\times425=5\times5\times85=5\times5\times5\times17\end{aligned}\right\}$

∴ L. C. M. is 1000×17, or, 17000.

(6) 3432) 3575 (1
3432
143) 3432 (24
286
572
572
∴ L. C. M. is 24 × 3575, or, 85800.

(7) 936) 2925 (3
2808
117) 936 (8
936
∴ L. C. M. is 8 × 2925, or, 23400.

(8) 2304) 4032 (
2304
1728) 2304 (1
1728
576) 1728 (3
1728
Now 4302 = 576 × 7
∴ L. C. M. is 2304 × 7, or, 16128.

(9) 2443) 4537 (1
2443
2094) 2443 (1
2094
349) 2094 (6
2094
Now 2443 ÷ 349 = 7
∴ L. C. M. is 4537 × 7, or, 31759.

Ex. (xxvi), p. 41.

(1)

2	6, 9, 24, 40
2	3, 9, 12, 20
2	3, 9, 6, 10
3	3, 9, 3, 5
	1, 3, 1, 5

∴ L. C. M. is 2 × 2 × 2 × 3 × 3 × 5, or, 360.

(2)

2	8, 12, 22, 55
2	4, 6, 11, 55
11	2, 3, 11, 55
	2, 3, 1, 5

∴ L. C. M. is 2 × 2 × 11 × 2 × 3 × 5, or, 1320.

(3)

2	12, 18, 96, 144
	6, 9, 48, 72
2	3, 9, 24, 36
2	3, 9, 12, 18
3	3, 9, 6, 9
3	1, 3, 2, 3
	1, 1, 2, 1

∴ L. C. M. is 2 × 2 × 2 × 2 × 3 × 3 × 2, or, 288.

(4)

2	16, 30, 48, 56, 72
2	8, 15, 24, 28, 36
2	4, 15, 12, 14, 18
2	2, 15, 6, 7, 9
3	1, 15, 3, 7, 9
	1, 5, 1, 7, 3

∴ L. C. M. is 16 × 3 × 5 × 7 × 3, or, 5040.

(5)

2	84, 156, 63, 99
2	42, 78, 63, 99
3	21, 39, 63, 99
3	7, 13, 21, 33
7	7, 13, 7, 11
	1, 13, 1, 11

∴ L. C. M. is 36 × 7 × 13 × 11, or, 36036.

(6)

2	27, 33, 54, 69, 132
3	27, 33, 27, 69, 66
9	9, 11, 9, 23, 22
11	1, 11, 1, 23, 22
	1, 1, 1, 23, 2

∴ L. C. M. is 6 × 9 × 11 × 46, or, 27324.

(7)

3	17, 51, 119, 210
7	17, 17, 119, 70
17	17, 17, 17, 10
	1, 1, 1, 10

∴ L. C. M. is 21 × 17 × 10, or, 3570.

(8)

2	15, 26, 39, 65, 180
3	15, 13, 39, 65, 90
5	5, 13, 13, 65, 30
13	1, 13, 13, 13, 6
	1, 1, 1, 1, 6

∴ L. C. M. is 30 × 13 × 6, or, 2340.

(9)
$$\begin{array}{r|rrrrr}
2 & 44, & 126, & 198, & 280, & 330 \\ \hline
2 & 22, & 63, & 99, & 140, & 165 \\ \hline
3 & 11, & 63, & 99, & 70, & 165 \\ \hline
3 & 11, & 21, & 33, & 70, & 55 \\ \hline
5 & 11, & 7, & 11, & 70, & 55 \\ \hline
7 & 11, & 7, & 11, & 14, & 11 \\ \hline
11 & 11, & 1, & 11, & 2, & 11 \\ \hline
 & 1, & 1, & 1, & 2, & 1
\end{array}$$

∴ L. C. M. is 36 × 5 × 7 × 11 × 2, or, 27720.

(10)
$$\begin{array}{r|rrrrr}
2 & 50, & 338, & 675, & 702, & 975 \\ \hline
3 & 25, & 169, & 675, & 351, & 975 \\ \hline
3 & 25, & 169, & 225, & 117, & 325 \\ \hline
3 & 25, & 169, & 75, & 39, & 325 \\ \hline
25 & 25, & 169, & 25, & 13, & 325 \\ \hline
13 & 1, & 169, & 1, & 13, & 13 \\ \hline
 & 1, & 13, & 1, & 1, & 1
\end{array}$$

∴ L. C. M. is 54 × 25 × 13 × 13, or, 228150.

Examination Papers, p. 41.

I.

(1)
$$\begin{array}{r}
10010010 \\
\underline{768008} \\
9242002
\end{array}$$

(2)
$$\begin{array}{r}
2014008 \\
\underline{769070} \\
140980560 \\
18126072 \\
12084048 \\
\underline{14098056} \\
769070\,)\,1548913132560\,(\,2014008 \\
\underline{1538140} \\
1077313 \\
\underline{769070} \\
3082432 \\
\underline{3076280} \\
6152560 \\
\underline{6152560}
\end{array}$$

```
(3)   3432 ) 3575 ( 1
             3432
             ────
          143 ) 3432 ( 24
                 286
                 ───
                  572
                  572
                  ───
```

∴ L. C. M. is 143.

```
(4)   4 | 48, 132, 63, 99
        |────────────────
      3 | 12,  33, 63, 99
        |────────────────
      3 |  4,  11, 21, 33
        |────────────────
     11 |  4,  11,  7, 11
        |────────────────
        |  4,   1,  7,  1
```

∴ L. C. M. is 36 × 11 × 4 × 7, or, 11088.

```
(5)    28701
        2342
       ─────
       57402
     114804
     86103
    57402
    ────────
    67217742
        2099
    ────────
    67219841
```

II.

```
(1)      72122
          8193
        ──────
        216366
       649098
     5841882
     ─────────
     590895546
```

```
(1)      8193
        72122
        ─────
        16386
       98316
     589896
     ─────────
     590895546
```

```
(2)   4 | 1834267
        |────────
      9 |  458566  and 3 units over.
        |────────
            50951  and 7 parcels of 4 units over.
```

(3) 1875) 2425 (1
1875
550) 1875 (3
1650
225) 550 (2
450
100) 225 (2
200
25) 100 (4
100

∴ H. C. F. is 25.

(4)

2	6, 18, 22, 99
3	3, 9, 11, 99
3	1, 3, 11, 33
11	1, 1, 11, 11
	1, 1, 1, 1

∴ L. C. M. is 18 × 11, or 198.

(5) The numbers are 3604, 3640, 3064, 3046, 3460, 3406
6304, 6340, 6034, 6043, 6430, 6403
4360, 4306, 4630, 4603, 4036, 4063
of which the sum is 83772.

III.

(1) 2029
847
1182

(2)

7	79875
9	11410 and 5 units over.
	1267 and 7 parcels of 7 units over.

(3) Ten millions, twenty thousand and thirty; ten billions, twenty thousand and thirty millions, forty thousand and fifty.

(4) 1632) 2976 (1
1632
1344) 1632 (1
1344
288) 1344 (4
1152
192) 288 (1
192
96) 192 (2
192

∴ H. C. F. is 96.

(5)

$$\begin{array}{r|l}
2 & 3, 8, 6, 14, 28, 32 \\ \hline
2 & 3, 4, 3, 7, 14, 16 \\ \hline
2 & 3, 2, 3, 7, 7, 8 \\ \hline
3 & 3, 1, 3, 7, 7, 4 \\ \hline
7 & 1, 1, 1, 7, 7, 4 \\ \hline
 & 1, 1, 1, 1, 1, 4
\end{array}$$

∴ L. C. M. is 8 × 3 × 7 × 4, or, 672.

IV.

(1)

$$\begin{array}{r}
31 \\
\underline{47} \\
217 \\
\underline{124} \\
1457
\end{array}$$

(2)

$$\begin{array}{rl}
7403006\,) & 13577113004\,(\,1834 \\
 & \underline{7403006} \\
 & 61741070 \\
 & \underline{59224048} \\
 & 25170220 \\
 & \underline{22209018} \\
 & 29612024 \\
 & \underline{29612024}
\end{array}$$

(3) 19 is the only factor common to the three products, and is therefore the H. C. F.

(4) 19 being the only factor common to the three products, the L. C. M. is 13 × 17 × 21 × 19.

(5)

$$\begin{array}{rl}
875\,) & 373625\,(\,427 \\
 & \underline{3500} \\
 & 2362 \\
 & \underline{1750} \\
 & 6125 \\
 & \underline{6125}
\end{array}$$

and 875 + 427 = 1302.

V.

(1) 80514603) 1046689839 (13
80514603

241543809
241543809

(2)

359	359	237	85083
237	856	856	307304
			202872
2513	2154	1422	595259
1077	1795	1185	
718	2872	1896	
85083	307304	202872	

(3) 1019527) 1231845 (1
1019527

212318) 1019527 (4
849272

170255) 212318 (1
170255

42063) 170255 (4
168252

2003) 42063 (21
4006

2003
2003

∴ H. C. F. is 2003

(4)

2	12, 18, 26, 117, 312
2	6, 9, 13, 117, 156
3	3, 9, 13, 117, 78
3	1, 3, 13, 39, 26
13	1, 1, 13, 13, 26
	1, 1, 1, 1, 2

∴ L. C. M. is 36 × 13 × 2, or, 936.

(5)

709514
381569

6385626
4257084
3547570
709514
5676112
2128542

270728547466

Two hundred and seventy thousand seven hundred and twenty-eight millions, five hundred and forty-seven thousand, four hundred and sixty-six.

VI.

(1) 25031007 ; one hundred and seventy-six millions, five hundred thousand three hundred and one.

(2)

905741
518963

2717223
5434446
8151669
7245928
905741
4528705

470046066583

Four hundred and seventy thousand and forty-six millions, sixty-six thousand five hundred and eighty-three.

(3) 743) 42146675 (56725
3715
4996
4458
5386
5201
1857
1486
3715
3715

(4)

Omitting 1, 3, 12 and 16.

2	5, 9, 14, 96, 128
16	5, 9, 7, 48, 64
3	5, 9, 7, 3, 4
	5, 3, 7, 1, 4

∴ L. C. M. is 96 × 15 × 28, or, 40320.

```
(5) 42435) 195615 (4
           169740
           ------
            25875) 42435 (1
                   25875
                   -----
                   16560) 25875 (1
                          16560
                          -----
                           9315) 16560 (1
                                  9315
                                  ----
                                  7245) 9315 (1
                                        7245
                                        ----
                                        2070)7245(3
                                             6210
                                             ----
                                             1035)2070(2
    ∴ H. C. F. is 1035.                           2070
                                                  ----
```

VII.

(1) **Three groups of ten units and four single units.**

```
(2)        54321) 201096342 (3702
                  162963
                  ------
                   381333
                   380247
                   ------
                     108642
                     108642
                     ------
```

```
(3)       3 | 964374
            |-------
          5 | 321458  and no units over.
            |-------
         11 |  64291  and 3 parcels of 3 units over.
            |-------
            |   5844  and 7 parcels of 15 units over.
```

∴ the remainder is 105 + 9, or, 114.

(4)
$$\begin{array}{r} 12\\ 37\\ \hline 84\\ 36\\ \hline 444 \end{array} \qquad\qquad \begin{array}{r} 444\\ 59\\ \hline 3996\\ 2220\\ \hline 26196 \end{array}$$

(5)
$$\begin{aligned} 28 &= 2 \times 14 = 2 \times 2 \times 7\\ 45 &= 5 \times 9 = 5 \times 3 \times 3\\ 135 &= 5 \times 27 = 5 \times 3 \times 3 \times 3\\ 243 &= 3 \times 81 = 3 \times 27 = 3 \times 3 \times 3 \times 3 \times 3. \end{aligned}$$

VIII.

(1)
$$\begin{array}{r|r} & 303066099\\ & 33060660990\\ \hline 3 & 33363727089\\ \hline 11 & 11121242363\\ \hline & 1011022033 \end{array}$$

One thousand and eleven millions twenty-two thousand and thirty-three.

(2)
$$\begin{array}{r|rl} 11 & 830728 & \\ \hline 3 & 75520 & \text{and 8 units over.}\\ \hline 7 & 25173 & \text{and 1 parcel of 11 units over.}\\ \hline & 3596 & \text{and 1 parcel of 33 units over.} \end{array}$$

∴ Remainder is $8 + 11 + 33 = 52$.

(3)
$$\begin{array}{r} 375\\ 250\\ \hline 18750\\ 750\\ \hline 93750 \end{array} \qquad\qquad \begin{array}{r} 93750\\ 14000\\ \hline 375000000\\ 93750\\ \hline 1312500000 \end{array}$$

(4) $87 = 3 \times 29$

$176 = 2 \times 88 = 2 \times 2 \times 44 = 2 \times 2 \times 2 \times 2 \times 11$

$576 = 2 \times 288 = 2 \times 2 \times 144 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3.$

(5) 504) 5292 (1
504
——
252) 504 (2
504
——

∴ The H. C. F. is 4.

252) 3040 (12
252
——
520
504
——
16) 252 (15
16
——
92
80
——
12) 16 (1
12
——
4) 12 (3
12
——

IX.

(1) 8666066066
2202002002
——
8 | 6464064064
8 | 808008008
——
101001001

One hundred and one millions, one thousand and one.

(2) 369) 2738 (7
2583
——
155

(3) 6258) 1270374 (203
12516
——
18774
18774
——

(4) 7.....2
999999
——
6.....3

for, whatever the digits may be in the vacant places, we must always carry on 1 from each step.

(5)
$$\begin{array}{r|l} 2 & 552,\ 575,\ 920 \\ \hline 4 & 276,\ 575,\ 460 \\ \hline 5 & 69,\ 575,\ 115 \\ \hline 5 & 69,\ 115,\ 115 \\ \hline 23 & 69,\ 23,\ 23 \\ \hline & 3,\ 1,\ 1 \end{array}$$

$\therefore$ L. C. M. is $200 \times 23 \times 3$, or, 13800

Ex. (xxvii), p. 47.

(1) $\frac{24}{80} = \frac{3\times8}{10\times8} = \frac{3}{10}$ (2) $\frac{72}{280} = \frac{9\times8}{35\times8} = \frac{9}{35}$

(3) $\frac{42}{210} = \frac{1\times42}{5\times42} = \frac{1}{5}$ (4) $\frac{192}{576} = \frac{1\times192}{3\times192} = \frac{1}{3}$

(5) $\frac{5184}{6912} = \frac{576}{768} = \frac{192}{256} = \frac{24}{32} = \frac{3}{4}$

(6) $\frac{1680}{1920} = \frac{168}{192} = \frac{56}{64} = \frac{7}{8}$

(7) $\frac{6409}{7395} = \frac{13\times493}{15\times493} = \frac{13}{15}$

(8) $\frac{319}{5687} = \frac{11\times29}{11\times517} = \frac{29}{517}$

(9) $\frac{9495}{15615} = \frac{1899}{3123} = \frac{211}{347}$

(10) $\frac{3178}{5221} = \frac{14\times227}{23\times227} = \frac{14}{23}$

Ex. (xxviii), p. 48.

(1) $\frac{3}{4} = \frac{3\times7}{4\times7} = \frac{21}{28}$ (2) $\frac{4}{9} = \frac{4\times6}{9\times6} = \frac{24}{54}$

$\frac{5}{7} = \frac{5\times4}{7\times4} = \frac{20}{28}$ $\frac{5}{18} = \frac{5\times3}{18\times3} = \frac{15}{54}$

$\frac{7}{27} = \frac{7\times2}{27\times2} = \frac{14}{54}$

(3) $\frac{3}{5} = \frac{3\times77}{5\times77} = \frac{231}{385}$

$\frac{4}{7} = \frac{4\times55}{7\times55} = \frac{220}{385}$

$\frac{6}{11} = \frac{6\times35}{11\times35} = \frac{210}{385}$

(4) $\frac{5}{12} = \frac{5\times20}{12\times20} = \frac{100}{240}$

$\frac{13}{20} = \frac{13\times12}{20\times12} = \frac{156}{240}$

$\frac{17}{80} = \frac{17\times3}{80\times3} = \frac{51}{240}$

$\frac{19}{120} = \frac{19\times2}{120\times2} = \frac{38}{240}$

(5) $\frac{4}{7} = \frac{4\times102}{7\times102} = \frac{408}{714}$

$\frac{15}{17} = \frac{15\times42}{17\times42} = \frac{630}{714}$

$\frac{26}{51} = \frac{26\times14}{51\times14} = \frac{364}{714}$

$\frac{65}{102} = \frac{65\times7}{102\times7} = \frac{455}{714}$

(6) $\frac{1}{3} = \frac{1\times30}{3\times30} = \frac{30}{90}$

$\frac{3}{5} = \frac{3\times18}{5\times18} = \frac{54}{90}$

$\frac{1}{6} = \frac{1\times15}{6\times15} = \frac{15}{90}$

$\frac{5}{18} = \frac{5\times5}{18\times5} = \frac{25}{90}$

(7) $\frac{3}{10} = \frac{3\times108}{10\times108} = \frac{324}{1080}$

$\frac{5}{27} = \frac{5\times40}{27\times40} = \frac{200}{1080}$

$\frac{7}{90} = \frac{7\times12}{90\times12} = \frac{84}{1080}$

$\frac{11}{360} = \frac{11\times3}{360\times3} = \frac{33}{1080}$

Ex. (xxix), p. 49.

(1) $\frac{3}{7} = \frac{3\times65}{7\times65} = \frac{195}{455}$

$\frac{4}{5} = \frac{4\times91}{5\times91} = \frac{364}{455}$

$\frac{9}{13} = \frac{9\times35}{13\times35} = \frac{315}{455}$

(2) $\frac{5}{6} = \frac{5\times51}{6\times51} = \frac{255}{306}$

$\frac{7}{9} = \frac{7\times34}{9\times34} = \frac{238}{306}$

$\frac{12}{17} = \frac{12\times18}{17\times18} = \frac{216}{306}$

(3) $\frac{9}{11} = \frac{9\times105}{11\times105} = \frac{945}{1155}$

$\frac{13}{15} = \frac{13\times77}{15\times77} = \frac{1001}{1155}$

$\frac{17}{21} = \frac{17\times55}{21\times55} = \frac{935}{1155}$

(5)
$$\begin{array}{r|l}
2 & 552,\ 575,\ 920 \\ \hline
4 & 276,\ 575,\ 460 \\ \hline
5 & 69,\ 575,\ 115 \\ \hline
5 & 69,\ 115,\ 115 \\ \hline
23 & 69,\ 23,\ 23 \\ \hline
 & 3,\ 1,\ 1
\end{array}$$

∴ L. C. M. is 200 × 23 × 3, or, 13800

Ex. (xxvii), p. 47.

(1) $\frac{24}{80} = \frac{3 \times 8}{10 \times 8} = \frac{3}{10}$ (2) $\frac{72}{280} = \frac{9 \times 8}{35 \times 8} = \frac{9}{35}$

(3) $\frac{42}{210} = \frac{1 \times 42}{5 \times 42} = \frac{1}{5}$ (4) $\frac{192}{576} = \frac{1 \times 192}{3 \times 192} = \frac{1}{3}$

(5) $\frac{5184}{6912} = \frac{576}{768} = \frac{192}{256} = \frac{24}{32} = \frac{3}{4}$

(6) $\frac{1680}{1920} = \frac{168}{192} = \frac{56}{64} = \frac{7}{8}$

(7) $\frac{6409}{7395} = \frac{13 \times 493}{15 \times 493} = \frac{13}{15}$

(8) $\frac{319}{5687} = \frac{11 \times 29}{11 \times 517} = \frac{29}{517}$

(9) $\frac{9495}{15615} = \frac{1899}{3123} = \frac{211}{347}$

(10) $\frac{3178}{5221} = \frac{14 \times 227}{23 \times 227} = \frac{14}{23}$

Ex. (xxviii), p. 48.

(1) $\frac{3}{4} = \frac{3 \times 7}{4 \times 7} = \frac{21}{28}$ (2) $\frac{4}{9} = \frac{4 \times 6}{9 \times 6} = \frac{24}{54}$

$\frac{5}{7} = \frac{5 \times 4}{7 \times 4} = \frac{20}{28}$ $\frac{5}{18} = \frac{5 \times 3}{18 \times 3} = \frac{15}{54}$

$\frac{7}{27} = \frac{7 \times 2}{27 \times 2} = \frac{14}{54}$

(3) $\frac{3}{5}=\frac{3\times77}{5\times77}=\frac{231}{385}$

$\frac{4}{7}=\frac{4\times55}{7\times55}=\frac{220}{385}$

$\frac{6}{11}=\frac{6\times35}{11\times35}=\frac{210}{385}$

(4) $\frac{5}{12}=\frac{5\times20}{12\times20}=\frac{100}{240}$

$\frac{13}{20}=\frac{13\times12}{20\times12}=\frac{156}{240}$

$\frac{17}{80}=\frac{17\times3}{80\times3}=\frac{51}{240}$

$\frac{19}{120}=\frac{19\times2}{120\times2}=\frac{38}{240}$

(5) $\frac{4}{7}=\frac{4\times102}{7\times102}=\frac{408}{714}$

$\frac{15}{17}=\frac{15\times42}{17\times42}=\frac{630}{714}$

$\frac{26}{51}=\frac{26\times14}{51\times14}=\frac{364}{714}$

$\frac{65}{102}=\frac{65\times7}{102\times7}=\frac{455}{714}$

(6) $\frac{1}{3}=\frac{1\times30}{3\times30}=\frac{30}{90}$

$\frac{3}{5}=\frac{3\times18}{5\times18}=\frac{54}{90}$

$\frac{1}{6}=\frac{1\times15}{6\times15}=\frac{15}{90}$

$\frac{5}{18}=\frac{5\times5}{18\times5}=\frac{25}{90}$

(7) $\frac{3}{10}=\frac{3\times108}{10\times108}=\frac{324}{1080}$

$\frac{5}{27}=\frac{5\times40}{27\times40}=\frac{200}{1080}$

$\frac{7}{90}=\frac{7\times12}{90\times12}=\frac{84}{1080}$

$\frac{11}{360}=\frac{11\times3}{360\times3}=\frac{33}{1080}$

Ex. (xxix), p. 49.

(1) $\frac{3}{7}=\frac{3\times65}{7\times65}=\frac{195}{455}$

$\frac{4}{5}=\frac{4\times91}{5\times91}=\frac{364}{455}$

$\frac{9}{13}=\frac{9\times35}{13\times35}=\frac{315}{455}$

(2) $\frac{5}{6}=\frac{5\times51}{6\times51}=\frac{255}{306}$

$\frac{7}{9}=\frac{7\times34}{9\times34}=\frac{238}{306}$

$\frac{12}{17}=\frac{12\times18}{17\times18}=\frac{216}{306}$

(3) $\frac{9}{11}=\frac{9\times105}{11\times105}=\frac{945}{1155}$

$\frac{13}{15}=\frac{13\times77}{15\times77}=\frac{1001}{1155}$

$\frac{17}{21}=\frac{17\times55}{21\times55}=\frac{935}{1155}$

(4) $\frac{3}{20}=\frac{3\times14}{20\times14}=\frac{42}{280}$

$\frac{7}{40}=\frac{7\times7}{40\times7}=\frac{49}{280}$

$\frac{11}{70}=\frac{11\times4}{70\times4}=\frac{44}{280}$

(5) $\frac{7}{33}=\frac{7\times99}{33\times99}=\frac{693}{3267}$

$\frac{9}{43}=\frac{9\times77}{43\times77}=\frac{693}{3311}$

$\frac{11}{53}=\frac{11\times63}{53\times63}=\frac{693}{3339}$

(6) $\frac{2}{17}=\frac{2\times6}{17\times6}=\frac{12}{102}$

$\frac{5}{34}=\frac{5\times3}{34\times3}=\frac{15}{102}$

$\frac{7}{51}=\frac{7\times2}{51\times2}=\frac{14}{102}$

Ex. (xxx), p. 50.

(1) $\frac{1}{7}+\frac{2}{5}=\frac{5}{35}+\frac{14}{35}=\frac{19}{35}$

(2) $\frac{2}{3}+\frac{3}{14}=\frac{28}{42}+\frac{9}{42}=\frac{37}{42}$

(3) $\frac{2}{7}+\frac{3}{11}+\frac{2}{33}=\frac{66}{231}+\frac{63}{231}+\frac{14}{231}=\frac{143}{231}=\frac{13}{21}$

(4) $\frac{4}{9}+\frac{5}{14}+\frac{5}{42}=\frac{56}{126}+\frac{45}{126}+\frac{15}{126}=\frac{116}{126}=\frac{58}{63}$

(5) $\frac{5}{13}+\frac{2}{39}+\frac{25}{78}+\frac{7}{156}=\frac{60}{156}+\frac{8}{156}+\frac{50}{156}+\frac{7}{156}$
$=\frac{125}{156}$

(6) $\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}+\frac{1}{32}=\frac{16+8+4+2+1}{32}=\frac{31}{32}$

(7) $\frac{5}{11}+\frac{2}{27}+\frac{7}{55}+\frac{4}{135}=\frac{675+110+189+44}{1485}=\frac{1018}{1485}$

(8) $\frac{1}{3}+\frac{1}{5}+\frac{1}{7}+\frac{1}{9}+\frac{1}{11}=\frac{1155+693+495+385+315}{3465}$
$=\frac{3043}{3465}$

(9) $\frac{2}{3}+\frac{3}{40}+\frac{7}{240}+\frac{11}{2880}=\frac{1920+216+84+11}{2880}=\frac{2231}{2880}$

Ex. (xxxi), p. 51.

(1) $\frac{5}{6} - \frac{4}{5} = \frac{25}{30} - \frac{24}{30} = \frac{1}{30}$

(2) $\frac{15}{19} - \frac{3}{7} = \frac{105}{133} - \frac{57}{133} = \frac{48}{133}$

(3) $\frac{12}{13} - \frac{11}{12} = \frac{144}{156} - \frac{143}{156} = \frac{1}{156}$

(4) $\frac{235}{357} - \frac{13}{51} = \frac{235}{357} - \frac{91}{357} = \frac{144}{357} = \frac{48}{119}$

(5) $\frac{17}{63} - \frac{29}{108} = \frac{204}{756} - \frac{203}{756} = \frac{1}{756}$

(6) $\frac{9}{38} - \frac{43}{209} = \frac{99}{418} - \frac{86}{418} = \frac{13}{418}$

(7) $\frac{146}{273} - \frac{268}{637} = \frac{1022}{1911} - \frac{804}{1911} = \frac{218}{1911}$

(8) $\frac{359}{360} - \frac{199}{200} = \frac{1795}{1800} - \frac{1791}{1800} = \frac{4}{1800} = \frac{1}{450}$

(9) $\frac{835}{1998} - \frac{347}{1242} = \frac{19205}{45954} - \frac{12839}{45954} = \frac{6366}{45954} = \frac{1061}{7659}$

Ex. (xxxii), p. 53.

(1) $\frac{3}{7} \times \frac{5}{9} = \frac{3 \times 5}{7 \times 3 \times 3} = \frac{5}{21}$

(2) $\frac{3 \times 5 \times 9}{4 \times 7 \times 11} = \frac{15 \times 9}{28 \times 11} = \frac{135}{308}$

(3) $\frac{42 \times 39 \times 24}{65 \times 56 \times 27} = \frac{2 \times 3 \times 7 \times 3 \times 13 \times 3 \times 8}{5 \times 13 \times 8 \times 7 \times 3 \times 3 \times 3} = \frac{2}{5}$

(4) $\frac{84 \times 102 \times 91}{85 \times 117 \times 132} = \frac{7 \times 12 \times 17 \times 6 \times 13 \times 7}{5 \times 17 \times 13 \times 9 \times 11 \times 12} = \frac{98}{165}$

(5) $\frac{17 \times 27 \times 123}{82 \times 38 \times 153} = \frac{17 \times 9 \times 3 \times 41 \times 3}{2 \times 41 \times 38 \times 17 \times 9} = \frac{9}{76}$

(6) $\frac{100 \times 35 \times 33}{161 \times 72 \times 40} = \frac{2 \times 5 \times 10 \times 7 \times 5 \times 3 \times 11}{7 \times 23 \times 2 \times 3 \times 12 \times 10 \times 4}$

$= \frac{5 \times 5 \times 11}{23 \times 12 \times 4} = \frac{275}{1104}.$

(7) $$\frac{9\times11\times13\times21}{10\times12\times14\times29}=\frac{9\times11\times13\times7\times3}{10\times3\times4\times7\times2\times29}$$
$$=\frac{9\times11\times13}{10\times4\times2\times29}=\frac{1287}{2320}$$

(8) $$\frac{292\times573\times248}{465\times657\times1719}=\frac{4\times73\times3\times191\times8\times31}{31\times15\times73\times9\times9\times191}$$
$$=\frac{4\times8}{5\times9\times9}=\frac{32}{405}$$

(9) $$\frac{1205\times712\times1535}{2763\times2169\times1068}=\frac{5\times241\times8\times89\times5\times307}{307\times9\times241\times9\times89\times12}$$
$$=\frac{5\times8\times5}{9\times9\times12}=\frac{50}{243}$$

Ex. (xxxiii), p. 54.

(1) $\frac{12}{49}\div\frac{3}{7}=\frac{12}{49}\times\frac{7}{3}=\frac{3\times4\times7}{7\times7\times3}=\frac{4}{7}$

(2) $\frac{25}{39}\div\frac{10}{13}=\frac{25}{39}\times\frac{13}{10}=\frac{5\times5\times13}{3\times13\times2\times5}=\frac{5}{6}$

(3) $\frac{85}{256}\div\frac{51}{64}=\frac{85}{256}\times\frac{64}{51}=\frac{5\times17\times64}{4\times64\times3\times17}=\frac{5}{12}$

(4) $\frac{16}{261}\div\frac{4}{27}=\frac{16\times27}{261\times4}=\frac{4\times4\times3\times9}{29\times9\times4}=\frac{12}{29}$

(5) $\frac{38}{275}\div\frac{133}{385}=\frac{38\times385}{275\times133}=\frac{2\times19\times11\times35}{11\times25\times7\times19}=\frac{2}{5}$

(6) $\frac{91}{369}\div\frac{78}{287}=\frac{91\times287}{369\times78}=\frac{13\times7\times41\times7}{9\times41\times6\times13}=\frac{49}{54}$

(7) $\frac{49}{550}\div\frac{343}{1450}=\frac{49\times1450}{550\times343}=\frac{49\times50\times29}{50\times11\times7\times49}=\frac{29}{77}$

(8) $$\frac{695}{1544}\div\frac{1251}{2316}=\frac{695\times2316}{1544\times1251}$$
$$=\frac{5\times139\times4\times579}{8\times193\times9\times139}=\frac{5}{6}$$

(9) $\frac{1535}{2421} \div \frac{921}{1076} = \frac{1535 \times 1076}{2421 \times 921}$

$= \frac{5 \times 307 \times 4 \times 269}{9 \times 269 \times 3 \times 307} = \frac{20}{27}$

Ex. (xxxiv), p. 56.

(1) $7\frac{4}{9} = \frac{63+4}{9} = \frac{67}{9}$ (2) $23\frac{15}{47} = \frac{1081+15}{47} = \frac{1096}{47}$

(3) $216\frac{13}{29} = \frac{6264+13}{29} = \frac{6277}{29}$

(4) $173\frac{19}{1000} = \frac{173000+19}{1000} = \frac{173019}{1000}$

(5) $\frac{427}{10} = \frac{420+7}{10} = 42\frac{7}{10}$

(6) $\frac{3477}{1000} = \frac{3000+477}{1000} = 3\frac{477}{1000}$

(7) $\frac{4293}{137} = \frac{4247+46}{137} = 31\frac{46}{137}$

(8) $\frac{65943}{71} = \frac{65888+55}{71} = 928\frac{55}{71}$

Ex. (xxxv), p. 58.

(1) $4\frac{2}{7} \div 3\frac{7}{9} = \frac{30}{7} \times \frac{9}{34} = \frac{2 \times 15 \times 9}{7 \times 2 \times 17} = \frac{135}{119} = 1\frac{16}{119}$

(2) $8\frac{3}{5} \div 6\frac{1}{7} = \frac{43}{5} \times \frac{7}{43} = \frac{7}{5} = 1\frac{2}{5}$

(3) $104\frac{2}{9} \div 53\frac{7}{13} = \frac{938}{9} \times \frac{13}{696} = \frac{2 \times 469 \times 13}{9 \times 2 \times 348} = \frac{6097}{3132} = 1\frac{2965}{3132}$

(4) $6\frac{2}{3} \times 9\frac{5}{6} = \frac{20 \times 59}{3 \times 6} = \frac{590}{9} = 65\frac{5}{9}$

(5) $14 \times 3\frac{2}{21} = \frac{14 \times 65}{21} = \frac{130}{3} = 43\frac{1}{3}$

(6) $9\frac{4}{15} \times 19\frac{2}{7} = \frac{139 \times 135}{15 \times 7} = \frac{139 \times 9}{7} = \frac{1251}{7} = 178\frac{5}{7}$

(7) $2\frac{1}{3} + 3\frac{1}{4} = 5 + \frac{1}{3} + \frac{1}{4} = 5\frac{7}{12}$

(8) $5\frac{2}{7} + 6\frac{3}{11} + 1\frac{4}{15} = 12 + \frac{330+315+308}{1155} = 12\frac{953}{1155}$

(9) $16\frac{2}{5} + 4\frac{4}{9} + 17\frac{13}{45} = 37 + \frac{18+20+13}{45} = 37 + \frac{51}{45} = 38\frac{2}{15}$

(10) $4\frac{3}{7} - 2\frac{1}{5} = 2 + \frac{3}{7} - \frac{1}{5} = 2\frac{8}{35}$

(11) $14\frac{4}{9} - 5\frac{7}{8} = 8 + \frac{8}{8} + \frac{4}{9} - \frac{7}{8} = 8 + \frac{1}{8} + \frac{4}{9} = 8\frac{41}{72}$

(12) $6\frac{7}{13} - 5\frac{9}{14} = \frac{14}{14} + \frac{7}{13} - \frac{9}{14} = \frac{5}{14} + \frac{7}{13} = \frac{65+98}{182} = \frac{163}{182}$

Ex. (xxxvi), p. 59.

(1) $\frac{3}{4}$ of $\frac{46}{9}$ of $\frac{36}{5} = \frac{3 \times 46 \times 36}{4 \times 9 \times 5} = \frac{138}{5} = 27\frac{3}{5}$

(2) $\frac{31}{7}$ of $\frac{56}{5}$ of $15 = \frac{31 \times 56 \times 15}{7 \times 5} = 31 \times 8 \times 3 = 744$

(3) $\frac{7}{8}$ of $\frac{23}{9}$ of $\frac{25}{7}$ of $90 = \frac{7 \times 23 \times 25 \times 90}{8 \times 9 \times 7} = \frac{23 \times 25 \times 10}{8} = 71\ \frac{3}{4}$

(4) $\frac{2}{5} \div \frac{7}{8} = \frac{2}{5} \times \frac{8}{7} = \frac{16}{35}$

(5) $6\frac{2}{9} \div 4\frac{2}{3} = \frac{56}{9} \times \frac{3}{14} = \frac{4}{3} = 1\frac{1}{3}$

(6) $14 \div 3\frac{1}{2} = \frac{14}{1} \times \frac{2}{7} = 4$

(7) $30\frac{1}{4} \div 11 = \frac{121}{4} \times \frac{1}{11} = \frac{11}{4} = 2\frac{3}{4}$

(8) $16\frac{2}{3} \div \frac{25}{39} = \frac{50}{3} \times \frac{39}{25} = 2 \times 13 = 26$

Ex. (xxxvii), p. 62.

(1) $\dfrac{6}{5 + \frac{3}{4}} = \frac{24}{20+3} = \frac{24}{23} = 1\,\frac{1}{23}$

(2) $\dfrac{7}{19 - \frac{3}{11}} = \frac{77}{209-3} = \frac{77}{206}$

(3) $\dfrac{\frac{4}{5}}{7 - \frac{2}{3}} = \frac{12}{105-10} = \frac{12}{95}$

(4) $\dfrac{6\frac{7}{8}}{11 - \frac{5}{12}} = \dfrac{\frac{55}{8}}{11 - \frac{5}{12}} = \frac{165}{264-10} = \frac{165}{254}$

(5) $\dfrac{\frac{4}{5} - \frac{3}{20}}{\frac{7}{10} - \frac{9}{40}} = \frac{32-6}{28-9} = \frac{26}{19} = 1\frac{7}{19}$

(6) $$\frac{\frac{11}{16}-\frac{5}{24}}{\frac{7}{12}+\frac{3}{4}}=\frac{33-10}{28+36}=\frac{23}{64}$$

(7) $$\frac{2}{5+\frac{6}{9+\frac{3}{4}}}=\frac{2}{5+\frac{24}{39}}=\frac{78}{195+24}=\frac{78}{219}=\frac{26}{73}$$

(8) $$\frac{3}{2+\frac{1}{3+\frac{1}{3}}}=\frac{3}{2+\frac{3}{10}}=\frac{30}{20+3}=\frac{30}{23}=1\frac{7}{23}$$

(9) $$\frac{5}{2-\frac{1}{4-\frac{2}{5}}}=\frac{5}{2-\frac{5}{18}}=\frac{90}{31}=2\frac{28}{31}$$

(10) $$\frac{1}{1+\frac{1}{1+\frac{1}{1+\frac{2}{5}}}}=\frac{1}{1+\frac{1}{1+\frac{5}{7}}}=\frac{1}{1+\frac{7}{12}}=\frac{12}{19}$$

Ex. (xxxviii), p. 63.

(1) $$3\frac{2}{5}\div\left(2\frac{1}{3}+1\frac{5}{7}\right)=3\frac{2}{5}\div\frac{85}{21}=\frac{17\times21}{5\times85}=\frac{21}{25}$$

(2) $$\left(4\frac{3}{11}+2\frac{1}{5}\right)\div35\frac{3}{5}=\frac{356}{55}\div35\frac{3}{5}=\frac{356\times5}{55\times178}=\frac{2}{11}$$

(3) $$\frac{2}{1+\frac{5}{7+\frac{2}{3}}}=\frac{2}{1+\frac{15}{23}}=\frac{46}{38}=1\frac{4}{19}$$

(4) $$\frac{1}{1+\frac{1}{1+\frac{1}{2}}}=\frac{1}{1+\frac{2}{3}}=\frac{3}{5}$$

(5) $$5+\frac{3}{4-\frac{5}{7+\frac{2}{5}}}=5+\frac{3}{4-\frac{25}{37}}=5+\frac{111}{123}=5\frac{37}{41}$$

(6) $$\frac{3}{7}+\frac{5}{9}\text{ of }\frac{3}{10}-\frac{2}{21}=\frac{3}{7}+\frac{1}{6}-\frac{2}{21}=\frac{18+7-4}{42}=\frac{1}{2}$$

(7) $$\frac{2}{3}\text{ of }\frac{5}{9}+\frac{3}{7}\div\frac{4}{5}=\frac{10}{27}+\frac{15}{28}=\frac{280+405}{756}=\frac{685}{756}$$

(8) $\left(\frac{11}{13} \div \frac{2}{7}\right)$ of $7\frac{7}{12} - 1\frac{3}{5} = \frac{77}{26} \times \frac{91}{12} - \frac{8}{5} = \frac{539}{24} - \frac{8}{5} = \frac{2503}{120} = 20\frac{103}{120}$

(9) $\left(\frac{4}{9} - \frac{3}{11}\right)\left(\frac{11}{4} + \frac{11}{3}\right) = \frac{17}{9 \times 11} \times \frac{77}{12} = \frac{119}{108} = 1\frac{11}{108}$

(10) $\left(\frac{3}{13} - \frac{2}{39}\right) \div \left(\frac{5}{78} + \frac{7}{156}\right) = \frac{7}{39} \div \frac{17}{156} = \frac{7 \times 156}{39 \times 17} = \frac{28}{17} = 1\frac{11}{17}$

(11) $$\frac{\left(2 + \frac{1}{5}\right) \div \left(3 + \frac{1}{7}\right)}{\left(\frac{1}{2} - \frac{1}{3}\right) \times \left(4 - 3\frac{3}{7}\right)} = \frac{\frac{11}{5} \times \frac{7}{22}}{\frac{1}{6} \times \frac{4}{7}} = \frac{\frac{7}{10}}{\frac{2}{21}} = \frac{147}{20} = 7\frac{7}{20}$$

(12) $$\frac{\left(3\frac{1}{3} - 2\frac{1}{2}\right) \div \frac{5}{6} \text{ of } \frac{3}{8}}{2\frac{2}{3} \div \left(\frac{1}{2} + \frac{1}{4}\right)} = \frac{\frac{5}{6} \div \frac{5}{16}}{\frac{8}{3} \div \frac{3}{4}} = \frac{\frac{16}{6}}{\frac{32}{9}} = \frac{16 \times 9}{6 \times 32} = \frac{3}{4}.$$

Ex. (xxxix), p. 63.

(1) $\frac{17}{33} + \frac{5}{12} + \frac{8}{44} + \frac{3}{28} + \frac{15}{56} = \frac{952+770+336+198+495}{1848}$
$= \frac{2751}{1848} = \frac{917}{616} = \frac{131}{88} = 1\frac{43}{88}$

(2) $\frac{2}{5}$ of $\frac{3}{7} + \frac{3}{7}$ of $2\frac{1}{3} = \frac{6}{35} + 1 = 1\frac{6}{35}$
$\left(\frac{2}{3} \text{ of } \frac{5}{6}\right) \div \left(\frac{5}{4} + \frac{4}{5}\right) = \frac{5}{9} \div \frac{41}{20} = \frac{5 \times 20}{9 \times 41}$
$\frac{41}{35} \times \frac{5 \times 20}{9 \times 41} = \frac{20}{63}$

(3) $1\frac{1}{2}$ of $\frac{4}{9} - \frac{2}{3}$ of $\frac{5}{6} = \frac{2}{3} - \frac{5}{9} = \frac{3}{27} = \frac{1}{9}$
$\left(\frac{2}{3} - \frac{4}{7}\right) \times \left(\frac{4}{5} - \frac{5}{8}\right) = \frac{2}{21} \times \frac{7}{40} = \frac{1}{60}$
$\frac{1}{9} \div \frac{1}{60} = \frac{60}{9} = 6\frac{2}{3}$

(4) $\frac{221}{629} = \frac{13 \times 17}{37 \times 17} = \frac{13}{37}$
$\frac{72816}{8528} = \frac{18204}{2132} = \frac{4551}{533} = \frac{111 \times 41}{13 + 41} = \frac{111}{13}$
$\frac{13}{37} \times \frac{111}{13} = 3$

(5) $\left(3\frac{2}{5} \times 3\frac{3}{7}\right) \div \left(1\frac{5}{7} \times 1\frac{13}{21}\right) = \left(\frac{17}{5} \times \frac{24}{7}\right) \div \left(\frac{12}{7} \times \frac{34}{21}\right)$
$= \frac{17 \times 24 \times 7 \times 21}{5 \times 7 \times 12 \times 34} = \frac{21}{5} = 4\frac{1}{5}$

(6) $\left(4\frac{1}{3} \times 2\frac{3}{4}\right) + 4\frac{3}{4} + 3\frac{1}{3} = \frac{143}{12} + 4\frac{3}{4} + 3\frac{1}{3}$
$= 18 + \frac{11}{12} + \frac{9}{12} + \frac{4}{12} = 18 + \frac{24}{12} = 20$

(7) $\frac{21}{71} - \frac{201}{701} = \frac{14721-14271}{71\times701} = \frac{450}{71\times701}$

$4\frac{7}{15} + 1\frac{3}{8} = \frac{67}{15} + \frac{11}{8} = \frac{536+165}{15\times8} = \frac{701}{15\times8}$

$\frac{450}{71\times701} \times \frac{701}{15\times8} = \frac{30}{71\times8} = \frac{15}{284}$

$\frac{15}{284} \times (10\frac{2}{5} - 5\frac{2}{3}) = \frac{15}{284} \times \frac{71}{15} = \frac{1}{4}$

(8) $(\frac{1}{3} + \frac{4}{7}) \times \dfrac{20\frac{1}{4}}{3\frac{6}{7} + 2\frac{1}{4}} = \frac{19}{21} \times \frac{567}{108+63} = \frac{19\times567}{21\times171} = 3$

(9) $(3\frac{4}{5} + 5\frac{1}{9} - \frac{1}{45})(4\frac{1}{5} - 3\frac{1}{4}) = 8\frac{40}{45} \times \frac{19}{20} = \frac{80}{9} \times \frac{19}{20} = \frac{4\times19}{9}$

$1\frac{5}{11} + 2\frac{1}{8} - (2\frac{9}{16} - \frac{1}{8} - \frac{1}{22}) = 3\frac{51}{88} - 2\frac{69}{176} = 1\frac{33}{176} = \frac{19}{16}$

$\frac{4\times19}{9} \div \frac{19}{16} = \frac{4\times19\times16}{9\times19} = \frac{64}{9} = 7\frac{1}{9}$

(10) $(1\frac{1}{3} + 2\frac{2}{7})\left(\dfrac{5\frac{1}{16}}{4\frac{6}{7} + 1\frac{1}{4}}\right) = 3\frac{13}{21} \times \frac{567}{544+140} = \frac{76\times567}{21\times684} = 3$

(11) $(7\frac{1}{9} + 1\frac{4}{5} - \frac{1}{45})(2\frac{1}{4} - \frac{4}{5}) = 8\frac{40}{45} \times \frac{29}{20} = \frac{80}{9} \times \frac{29}{20} = \frac{4\times29}{9}$

$4\frac{1}{8} - \frac{6}{11} - (2\frac{7}{8} - \frac{7}{16} - \frac{1}{22}) = 3\frac{51}{88} - 2\frac{69}{176} = 1\frac{33}{176} = \frac{19}{16}$

$\frac{4\times29}{9} \div \frac{19}{16} = \frac{4\times29\times16}{9\times19} = \frac{1856}{171} = 10\frac{146}{171}$

(12) $\dfrac{6\frac{3}{4} - 1\frac{5}{14}}{2\frac{1}{6} + 1\frac{3}{7}} = \dfrac{5\frac{11}{28}}{3\frac{25}{42}} = \frac{151\times42}{151\times28} = \frac{3}{2} = 1\frac{1}{2}$

$(\frac{5}{7} \text{ of } 1\frac{6}{13}) \div \dfrac{2\frac{5}{7}}{3\frac{1}{4}} = \frac{5\times19}{7\times13} \div \frac{19\times4}{13\times7} = \frac{5\times19\times13\times7}{7\times13\times19\times4} = 1\frac{1}{4}$

(13) $\dfrac{1}{4 - \dfrac{1}{2 - \dfrac{1}{1 - \frac{5}{13}}}} = \dfrac{1}{4 - \dfrac{1}{2 - \frac{13}{8}}} = \dfrac{1}{4 - \frac{8}{3}} = \frac{3}{4}$

$\dfrac{1}{4 + \dfrac{1}{1 - \dfrac{1}{2 - \frac{9}{16}}}} = \dfrac{1}{4 + \dfrac{1}{1 - \frac{16}{23}}} = \dfrac{1}{4 + \frac{23}{7}} = \frac{7}{51}$

(14) $$\frac{10\frac{2}{5} - 1\frac{5}{7}}{7\frac{1}{8} + 3\frac{3}{40}} = \frac{8\frac{24}{35}}{10\frac{1}{5}} = \frac{304 \times 5}{51 \times 35} = \frac{304}{357}$$

$$\left(\tfrac{3}{7} \text{ of } 2\tfrac{1}{17}\right) \div \frac{1\frac{2}{3}}{2\frac{3}{7}} = \frac{3 \times 35}{7 \times 17} \div \frac{5 \times 7}{3 \times 17} = \frac{3 \times 35 \times 3 \times 17}{7 \times 17 \times 5 \times 7} = 1\tfrac{2}{7}$$

(15) $$\frac{8\frac{7}{8} - 7\frac{6}{7} + 5\frac{5}{6} - 4\frac{4}{5}}{9\frac{9}{10} - 8\frac{13}{15} + 7\frac{7}{8} - 6\frac{6}{7}} = \frac{1\frac{1}{56} + 1\frac{1}{30}}{1\frac{1}{30} + 1\frac{1}{56}} = 1$$

$$1\tfrac{21}{43} \times \tfrac{37797}{75008} = \tfrac{64 \times 37797}{43 \times 75008} = \tfrac{879}{1172} = \tfrac{3 \times 293}{4 \times 293} = \tfrac{3}{4}$$

(16) $$\frac{5 - \dfrac{1}{5 - \frac{1}{5}}}{3 - \dfrac{1}{3 - \frac{1}{3}}} \times \frac{9}{23} \times 7 = \frac{5 - \frac{5}{24}}{3 - \frac{3}{8}} \times \frac{9}{23} \times 7 = \frac{115 \times 9 \times 7}{63 \times 23} = 5$$

$$\frac{6 + \dfrac{1}{6 - \frac{1}{6}}}{4 - \dfrac{1}{4 - \frac{1}{4}}} \times 10\frac{8}{9} = \frac{6 + \frac{6}{35}}{4 - \frac{4}{15}} \times \frac{98}{9} = \frac{648 \times 98}{392 \times 9} = 18$$

(17) $$\frac{8\frac{3}{5} - 7\frac{3}{4} + 5\frac{2}{3} - 4\frac{1}{2}}{13 - 11\frac{9}{10} + 10\frac{7}{9} - 9\frac{17}{20}} = \frac{2 + \frac{3}{5} + \frac{2}{3} - \frac{3}{4} - \frac{1}{2}}{3 + \frac{7}{9} - \frac{9}{10} - \frac{17}{20}}$$

$$= \frac{\frac{3}{5} + \frac{2}{3} + \frac{1}{4} + \frac{1}{2}}{1 + \frac{7}{9} + \frac{1}{10} + \frac{3}{20}} = \frac{\frac{121}{60}}{\frac{365}{180}} = \frac{121 \times 3}{365}$$

$$\tfrac{121 \times 3}{365} \times \tfrac{2}{11} \text{ of } 365 = 11 \times 3 \times 2 = 66$$

(18) $$\frac{\frac{1}{21} \times \frac{132}{23} \times \frac{69}{11} + \frac{325}{51} \times \frac{72}{49} \times \frac{17}{39} + \frac{59}{49}}{\frac{529}{57} \times \frac{45}{23} \times \frac{38}{207} + \frac{245}{78} \times \frac{143}{21} \times \frac{32}{245}} \times \frac{112}{9}$$

$$= \frac{\frac{12}{7} + \frac{200}{49} + \frac{59}{49}}{\frac{10}{3} + \frac{176}{63}} \times \frac{112}{9} = \frac{\frac{343}{49}}{\frac{386}{63}} \times \frac{112}{9}$$

$$= \tfrac{7 \times 112 \times 63}{386 \times 9} = \tfrac{2744}{193} = 14\tfrac{42}{193}$$

(19) $$\frac{\frac{1}{23} \times \frac{115}{17} \times \frac{323}{13} - \frac{85}{18} \times \frac{135}{34} \times \frac{96}{325}}{\frac{169}{19} \times \frac{209}{39} \times \frac{32}{143} - \frac{159}{20} \times \frac{336}{65} \times \frac{25}{371}} \times \frac{100}{23}$$

$$= \frac{\frac{5 \times 19}{13} - \frac{3 \times 24}{13}}{\frac{32}{3} - \frac{36}{13}} \times \frac{100}{23} = \frac{\frac{23}{13}}{\frac{308}{39}} \times \frac{100}{23} = \frac{3 \times 100}{308} = \frac{75}{77}$$

(20) $$\frac{19}{7 \times \dfrac{2}{3 - 1\frac{2}{3}}} \times \frac{7735}{67184} \div \left(\frac{19}{16} - \frac{47}{48}\right)$$

$$= \frac{19}{7 \times \frac{6}{4}} \times \frac{7735}{67184} \div \frac{10}{48}$$

$$= \frac{19 \times 4 \times 7735 \times 48}{7 \times 6 \times 67184 \times 10} = \frac{2 \times 1105 \times 8}{3536 \times 5} = \frac{221}{221} = 1$$

(21) $$\frac{1}{2 + \frac{18}{29}} \times \frac{4862}{4147} \div \left(\frac{3}{2} - \frac{23}{38}\right)$$

$$= \frac{29}{76} \times \frac{4862}{4147} \div \frac{34}{38}$$

$$= \frac{29 \times 4862 \times 38}{76 \times 4147 \times 34} = \frac{2431}{143 \times 34} = \frac{17}{34} = \frac{1}{2}$$

(22) $$\frac{\dfrac{7}{4 - \frac{5}{6}} - \dfrac{5}{6 - \frac{3}{8}}}{\dfrac{4}{7 - \frac{4}{7}} + \dfrac{2}{4 - \frac{2}{5}}} \times \frac{\dfrac{1}{\frac{1}{2} - \frac{27}{59}} - 13}{19 - \dfrac{1}{\frac{1}{2} - \frac{6}{31}}}$$

$$= \frac{\frac{42}{19} - \frac{40}{45}}{\frac{28}{45} + \frac{10}{18}} \times \frac{\frac{118}{5} - 13}{19 - \frac{62}{19}}$$

$$= \frac{\frac{1130}{19 \times 45}}{\frac{106}{90}} \times \frac{\frac{53}{5}}{\frac{299}{19}}$$

$$= \frac{1130 \times 90 \times 53 \times 19}{19 \times 45 \times 106 \times 5 \times 299} = \frac{226 \times 2 \times 53}{106 \times 299} = \frac{226}{299}$$

(23) $$\frac{\frac{10}{11} + \frac{18}{19}}{\frac{12}{7} - \frac{5}{11}} \times \frac{\frac{9}{4} - \frac{22}{14}}{\frac{56}{57} - \frac{110}{228}}$$

$$= \frac{\frac{388}{11 \times 10}}{\frac{97}{11 \times 7}} \times \frac{\frac{19}{28}}{\frac{114}{228}} = \frac{388 \times 7}{97 \times 19} \times \frac{19 \times 228}{28 \times 114}$$

$$= \frac{4 \times 7 \times 2}{28} = 2$$

Ex. (xl), p. 68.

(1) $\cdot 5 = \frac{5}{10} = \frac{1}{2}$ (2) $\cdot 25 = \frac{25}{100} = \frac{1}{4}$

(3) $\cdot 75 = \frac{75}{100} = \frac{3}{4}$ (4) $\cdot 375 = \frac{375}{1000} = \frac{3}{8}$

(5) $\cdot 00243 = \frac{243}{100000}$

(6) $\cdot 0000725 = \frac{725}{10000000} = \frac{29}{400000}$

(7) $14 \cdot 8 = \frac{148}{10} = \frac{74}{5}$ (8) $104 \cdot 235 = \frac{104235}{1000} = \frac{20847}{200}$

(9) $50 \cdot 0004 = \frac{500004}{10000} = \frac{125001}{2500}$ (10) $100 \cdot 001 = \frac{100001}{1000}$

(11) $\frac{9}{10} = \cdot 9$ (12) $\frac{37}{100} = \cdot 37$ (13) $\frac{4579}{10000} = \cdot 4579$

(14) $\frac{3}{1000} = \cdot 003$ (15) $\frac{17295}{100} = 172 \cdot 95$

(16) $\frac{59}{10000000} = \cdot 0000059$ (17) $\frac{25679}{1000000} = \cdot 025679$

(18) $\frac{325793}{100000} = 3 \cdot 25793$ (19) $\frac{19}{10000} = \cdot 0019$

Ex. (xli), p. 71.

(1)
$$\begin{array}{r@{\cdot}l} & 275 \\ & 425 \\ \hline & 700 \end{array}$$

(2)
$$\begin{array}{r@{\cdot}l} & 007 \\ & 2394 \\ \hline & 2464 \end{array}$$

(3)
$$\begin{array}{r@{\cdot}l} & 001 \\ & 0002 \\ \hline & 0012 \end{array}$$

(4)
$$\begin{array}{r@{\cdot}l} 13 & 279 \\ 3 & 00046 \\ 742 & 000372 \\ \hline 758 & 279832 \end{array}$$

(5)
$$\begin{array}{r@{\cdot}l} & 000493 \\ 3 & 24 \\ 15 & \\ 42 & 6 \\ 324 & 42037 \\ \hline 385 & 260863 \end{array}$$

(6)
$$\begin{array}{r@{\cdot}l} 49 & 327 \\ & 458 \\ 8317 & 05 \\ 341 & 875 \\ 32 & 4962 \\ \hline 8741 & 2062 \end{array}$$

(7)
$$\begin{array}{r@{\cdot}l} 700 & 372 \\ 894 & 0009 \\ & 347 \\ & 00082 \\ 5370 & 006 \\ \hline 6964 & 72672 \end{array}$$

(8)
$$\begin{array}{r@{\cdot}l} 560 & 379 \\ & 45687 \\ 350 & 0036 \\ 7 & 074 \\ 52 & 257 \\ \hline 970 & 17047 \end{array}$$

Ex. (xlii), p. 72.

(1)
56·429
5·218
51·211

(2)
9·005
7·462
1·543

(3)
53·3160
5·0867
48·2293

(4)
·800
·799
·001

(5)
6·0470
5·9863
·0607

(6)
850·0070
270·8796
579·1274

(7)
·0000100
·0000086
·0000014

(8)
·005370
·000985
·004385

(9)
10·0000
·0002
9·9998

(10)
·10100
·09999
·00101

Ex. (xliii), p. 74.

(1)
7·5
4·7
525
300
35·25

(2)
3·62
5·23
1086
724
1810
18·9326

(3)
·427
·235
2135
1281
854
·100345

(4)
·562
·00074
2248
3934
·00041588

(5)
3·00704
4·0205
1503520
601408
1202816
12·089804320

(6)
·0009
1000
·9000

(7)
623·4075
24·0259
56106675
31170375
12468150
249363000
12468150
14977·92625425

(8)
·00746
·006235
3730
2238
1492
4476
00004651310

(9) 1432·6749
·00004030705
71633745
100287243
42980247
57306996
·057746898828045

(10) 50704·042
·004007090061
50704042
304224252
456336378
354928294
202816168
203·175662750726562

(11) ·407
4·03
1221
1628
1·64021
·006
·00984126

(12) 1·01
1000
1010·00
·001
1·010

(13) ·52
·007
·00364
4·3
1092
1456
·015652
·02
·00031304

(14) 52·47
4·6
31482
20988
241·362
·07
16·89534
·009
·15205806

(15) 42·6
·795
2130
3834
2982
33·8670
4·03
101601
135468
136·48401
·00074
54593604
95538807
·1009981674

(16) 2·74
2·74
1096
1918
548
7·5076
2·74
300304
525532
150152
20·570824

(17) 3·5
3·5
175
105
12·25
12·25
6125
2450
2450
1225
150·0625

Ex. (xliv), p. 78.

(1) 108) 1296 (12
108
216
216

(2) 12 | 172800
14400

(8) 13) ·0169 (·0013
13
39
39

(4) 23) 292100 (12700
23
62
46
161
161
00

(5) 3629) 156330·062 (43·078
14516
11170
10887
28306
25403
29032
29032

(6) 1 | 10000
10000

(7) 72) 30960 (430
288
216
216
0

(8) 52) 7644 (147
52
244
208
364
364

(9) 307) ·0000615228 (·0000002004
614
1228
1228

```
(10)  758 ) 74644·808 ( 98·476
            6822
            ----
             6424
             6064
             ----
              3608
              3032
              ----
               5760
               5306
               ----
                4548
                4548
                ----
```

```
(11)  369 ) 2·4294591 ( ·0065839
            2214
            ----
             2154
             1845
             ----
              3095
              2952
              ----
               1439
               1107
               ----
                3321
                3321
                ----
```

```
(12)  73 ) 63987420000 ( 876540000
           584
           ---
            558
            511
            ---
             477
             438
             ---
              394
              365
              ---
               292
               292
               -------
                  0000
```

```
(13)  3500 ) ·2698636500 ( ·0000771039
              24500
              -----
               24863
               24500
               -----
                 3636
                 3500
                 -----
                  13650
                  10500
                  -----
                   31500
                   31500
                   -----
```

```
(14)  9 | 2698614000
          ----------
           299846000
```

(15) 65) 13·10530 (·20162
130
105
65
403
390
130
130

(16) 25) 61732500000 (2469300000
50
117
100
173
150
232
225
75
75
00000

(17) 231) 830676 (3596
693
1376
1155
2217
2079
1386
1386

(18) 673) ·00019517 (·00000029
1346
6057
6057

(19) 79) 101910 (1290
79
229
158
711
711
0

(20) 579) 2078·61 (3·59
1737
3416
2895
5211
5211

(21) 527) 241160·47 (457·61
2108
3036
2635
4010
3689
3214
3162
527
527

(22) 854) 65220·834 (76·371
5978
5440
5124
3168
2562
6063
5978
854
854

(23) 518963) 470046066583000 (905741000
4670667
2979366
2594815
3845515
3632741
2127748
2075852
518963
518963
000

Ex. (xlv), p. 80.

(1) 32) 745·00000 (23·28125
64
105
96
90
64
260
256
40
32
80
64
160
160

(2) 128) 143·270000000 (1·119296875
128
152
128
247
128
1190
1152
380
256
1240
1152
880
768
1120
1024
960
896
640
640

(3) 125) 432·6000 (3·4608
375
576
500
760
750
1000
1000

(4) 225) 7432974·00 (33035·44
675
682
675
797
675
1224
1125
990
900
900
900

(5) 625) 1·20000 (·00192
625
5750
5625
1250
1250

```
(6)  1250) ·2170000 ( ·0001736
           1250
           ----
            9200
            8750
            ----
             4500
             3750
             ----
              7500
              7500
              ----
```

Ex. (xlvi), p. 80.

```
(1)   4 | 426·4780             (2)   8 | ·0784978200
        |---------                     |------------
      4 | 106·619500                 9 | ·0098122275
        |-----------                   |------------
          26·654875                      ·0010902475

(3)   5 | 362470               (4)   9 | ·0007263
        |-------                       |---------
      5 |  72494·0                   5 | ·00008070
        |---------                     |----------
          14498·8                        ·00001614

(5)   3 | 4200·7437            (6)  10 | ·00463
        |-----------                   |---------
      8 | 1400·2479000               5 | ·0004630
        |-------------                 |---------
          175·0309875                    ·0000926

(7)   4 | 2471500              (8)   9 | 900000000
        |--------                      |----------
      4 |  617875                    4 | 100000000
        |---------                     |----------
          154468·75                       25000000

(9)  10 | ·001                (10)   2 | ·0010010010
        |------                        |------------
     10 | ·0001                   1000 | ·0005005005
        |------                        |------------
          ·00001                         ·0000005005005
```

Ex. (xlvii), p. 82.

(1) 23) 425000·000 (18478·260
23
195
184
110
92
180
161
190
184
60
46
140
138
20

(2) 79) 19·700 (·249
158
390
316
740
711

(3) 409) 37·900 (·092
3681
1090
818
272

(4) 313) 2710000000·000 (8658146·964
2504
2060
1878
1820
1565
2550
2504
460
313
1470
1252
2180
1878
3020
2817
2030
1878
1520
1252
268

(5) 281) 26·900 (·095
2529
1610
1405
205

(6) 7 | 229000·000
32714·285

Ex. (xlviii), p. 85.

(1) $\frac{7}{20} = \frac{\cdot 7}{2} = \cdot 35$

(2) $\frac{11}{25} = \frac{44}{100} = \cdot 44$

(3)
$$\begin{array}{r|l} 7 & 6\cdot000000 \\ \hline & \cdot\dot{8}5714\dot{2} \end{array}$$

(4)
$$\begin{array}{r|r} 9 & 1\cdot00000 \\ \hline 11 & \cdot1111\dot{1} \\ \hline & \cdot\dot{0}\dot{1}01 \end{array}$$

(5)
$$\begin{array}{l} 999\,)\,1\cdot000\,(\,\cdot\dot{0}0\dot{1} \\ \quad\;\;\; \underline{999} \\ \qquad\;\; 1000 \end{array}$$

(6)
$$\begin{array}{l} 41\,)\,1\cdot00000\,(\,\cdot\dot{0}243\dot{9} \\ \qquad\; \underline{82} \\ \qquad\; 180 \\ \qquad\; \underline{164} \\ \qquad\;\; 160 \\ \qquad\;\; \underline{1\ \ 3} \\ \qquad\;\;\; 370 \\ \qquad\;\;\; \underline{369} \\ \qquad\;\;\;\;\; 1 \end{array}$$

(7)
$$\begin{array}{r|l} 3 & 11\cdot0 \\ \hline 7 & 3\cdot6\dot{6} \\ \hline & \cdot\dot{5}2380\dot{9} \end{array}$$

(8) $\frac{13}{60} = \frac{1\cdot3}{6} = \cdot21\dot{6}$

(9)
$$\begin{array}{l} 1375\,)\,17\cdot00000\,(\,\cdot012\dot{3}\dot{6} \\ \qquad\quad \underline{1375} \\ \qquad\quad\; 3250 \\ \qquad\quad\; \underline{2750} \\ \qquad\quad\;\; 5000 \\ \qquad\quad\;\; \underline{4125} \\ \qquad\quad\;\;\; 8750 \\ \qquad\quad\;\;\; \underline{8250} \\ \qquad\quad\;\;\;\; 500 \end{array}$$

(10)
$$\begin{array}{r|r} 5 & 129\cdot0 \\ \hline 11 & 25\cdot800 \\ \hline & 2\cdot3\dot{4}\dot{5} \end{array}$$

Ex. (xlix), p. 87.

(1) $\cdot\dot{6} = \frac{6}{9} = \frac{2}{3}$ (2) $\cdot\dot{2}\dot{7} = \frac{27}{99} = \frac{3}{11}$ (3) $\cdot\dot{0}4\dot{5} = \frac{45}{999} = \frac{5}{111}$

(4) $\cdot\dot{3}12\dot{3} = \frac{3123}{9999} = \frac{347}{1111}$ (5) $\cdot\dot{0}07\dot{2} = \frac{72}{9999} = \frac{8}{1111}$

(6) $\cdot\dot{4}02\dot{3} = \frac{4023}{9999} = \frac{447}{1111}$ (7) $\cdot\dot{0}005\dot{4} = \frac{54}{99999} = \frac{6}{11111}$

(8) $\cdot\dot{0}000\dot{9} = \frac{9}{99999} = \frac{1}{11111}$

Ex. (l), p. 88.

(1) $\cdot4\dot{2}\dot{5} = \frac{425-4}{990} = \frac{421}{990}$ (2) $\cdot47\dot{5}\dot{9} = \frac{4759-47}{9900} = \frac{4712}{9900} = \frac{1178}{2475}$

(3) $4\cdot25\dot{3} = \frac{4253-425}{900} = \frac{3828}{900} = \frac{1276}{300} = \frac{319}{75} = 4\frac{19}{75}$

(4) $\cdot004\dot{2}\dot{6} = \frac{426-4}{99000} = \frac{422}{99000} = \frac{211}{49500}$

(5) $53\cdot00\dot{2}4\dot{3} = 53\frac{243}{99900} = 53\frac{27}{11100} = 53\frac{9}{3700}$

(6) $7\cdot2\dot{0}1\dot{1} = 7\frac{2011-2}{9990} = 7\frac{2009}{9990}$

(7) $2\cdot53\dot{0}\dot{6} = 2\frac{5306-53}{9900} = 2\frac{5253}{9900} = 2\frac{1751}{3300}$

Ex. (li), p. 89.

(1)
$$\begin{array}{r|l} 2\cdot577 & 777 \\ \cdot043 & 043 \\ 13\cdot222 & 222 \\ \hline 15\cdot8\dot{4}3 & \dot{0}43 \end{array}$$

(2)
$$\begin{array}{r|l} 14\cdot762 & 626262 \\ 3\cdot549 & 549549 \\ 2\cdot204 & 444444 \\ \hline 20\cdot51\dot{6} & 6202\dot{5}6 \end{array}$$

(3)
$$\begin{array}{r|l} 15\cdot025 & 252525 \\ 13\cdot247 & 247247 \\ \hline 1\cdot7\dot{7}8 & 005\dot{2}78 \end{array}$$

(4)
$$\begin{array}{r|l} \cdot02464 & 646464 \\ \cdot00397 & 397397 \\ \hline \cdot02\dot{0}67 & 24\dot{9}067 \end{array}$$

(5) $3\cdot\dot{7} \times 5\cdot\dot{4}\dot{9} = \frac{37-3}{9} \times \frac{549-5}{99} = \frac{34\times544}{9\times99} = \frac{18496}{891} = 20\frac{676}{891}$

(6) $\cdot007\dot{2} \times \cdot\dot{4}\dot{5} = \frac{72-7}{9000} \times \frac{45}{99} = \frac{65\times5}{9000\times11} = \frac{13}{360\times11} = \frac{13}{3960}$

(7) $3\cdot\dot{4} \div 4\cdot0\dot{9} = \frac{34-3}{9} \div \frac{409-40}{90} = \frac{31\times90}{9\times369} = \frac{310}{369}$

(8) $\cdot0\dot{7}\dot{4} \div \cdot5\dot{9} = \frac{74}{990} \div \frac{59-5}{90} = \frac{74\times90}{990\times54} = \frac{37}{11\times27} = \frac{37}{297}$

Ex. (lii), p. 90.

(1)

```
  ·0204          37) 99966·6 ( 2701·8
  40·2               74
 ------              --
   408               259
 816                 259
 ------              ---
 ·82008                66
                       37
                       --
                       296
                       296
                       ---
```

(2)

```
     ·0701       37) 88866600 ( 2401800
   700·01            74
   ------            --
      701            148
   49070             148
 ---------           ---
 49·070701             66
                       37
                       --
                       296
                       296
                       ----
                         00
```

(3)

```
150) 13·000 ( ·086̇      495) 17·000 ( ·03̇4̇       3 | 61·0
     1200                     1485                  |------
     ----                     ----              11 | 20·3̇3
      1000                     2150                 |------
       900                     1980                   1·8̇4̇
      ----                     ----
       100                      170
```

(4)

```
450) 7·000 (·015̇      165) 31·000 ( ·18̇7̇       6 | 53·00
     450                    165                    |------
     ----                   ----               11 |  8·83̇3
     2500                   1450                   |------
     2250                   1320                      ·80̇3̇
     ----                   ----
      250                    1300
                             1155
                             ----
                              145
```

(5) $\frac{454206}{3\cdot05\times\cdot073}=\frac{454206}{\cdot22265}=\frac{45420600000}{22265}=2040000$

$\frac{454206}{6\cdot1\times2\cdot04}=\frac{454206}{12\cdot444}=\frac{454206000}{12444}=36500$

(6) $\frac{3833336}{\cdot031\times2\cdot05}=\frac{3833336}{\cdot06355}=\frac{38333360000000}{6355}=60320000$

$\frac{3833336}{8\cdot99\times20\cdot8}=\frac{3833336}{186\cdot992}=\frac{3833336000}{186992}=20500$

(7)
$$\begin{array}{r} 35\cdot603 \\ 27\cdot61 \\ \hline 35603 \\ 213618 \\ 249221 \\ 71206 \\ \hline 982\cdot99883 \end{array}$$

$43\cdot\dot{2}9\dot{1}\times6\cdot2\dot{4}=\frac{43291-43}{999}\times\frac{624-62}{90}$

$=\frac{43248\times562}{999\times90}=\frac{14416\times281}{333\times45}=\frac{4050896}{14985}$

14985) 4050896·0 ($270\cdot3\dot{3}0063396\dot{7}$

$$\begin{array}{l} 29970 \\ \hline 105389 \\ 104895 \\ \hline 49460 \\ 44955 \\ \hline 45050 \\ 44955 \\ \hline 95000 \\ 89910 \\ \hline 50900 \\ 44955 \\ \hline 59450 \\ 44955 \\ \hline 144950 \\ 134865 \\ \hline 100850 \\ 89910 \\ \hline 109400 \\ 104895 \\ \hline 4505 \end{array}$$

(8) $\frac{186\cdot4302}{31\cdot02}=\frac{18643\cdot02}{3102}=6\cdot01$

$\frac{18643\cdot02}{\cdot3102}=\frac{186430200}{3102}=60100$

$\frac{1864302}{3\cdot102}=\frac{1864302000}{3102}=601000$

(9)
$$\begin{array}{r} 421\cdot619 \\ \cdot547 \\ \hline 2951333 \\ 1686476 \\ 2108095 \\ \hline 230\cdot625593 \end{array}$$

4206) 2107206 (501

$$\begin{array}{r} 21030 \\ \hline 4206 \\ 4206 \\ \hline \end{array}$$

(10)

```
713) 86354·7000 ( 121·1145
     713
     ---
     1505
     1426
     ----
       794
       713
       ---
        817
        713
        ---
        1040
         713
        ----
         3270
         2852
         ----
          4180
          3565
          ----
           615
```

(11)

```
7 | 104·000000
    ----------
```

$14\cdot\dot{8}5714\dot{2}$

(12)

```
974) 860753·5000 ( 883·7304
     7792
     ----
      8155
      7792
      ----
       3633
       2922
       ----
        7115
        6818
        ----
         2970
         2922
         ----
          4800
          3896
          ----
           904
```

(13)

```
   76·371
    8·54
   ------
   305484
  381855
 610968
---------
652·20834
```

$2\cdot9\dot{8}0\dot{1} + 7\cdot\dot{4}5\dot{0} = \frac{29801-29}{9990} + \frac{7450-7}{999}$

$= \frac{29772\times999}{9990\times7443} = \frac{29772}{74430} = \cdot4$

(14) $\frac{378\cdot48}{456} = \cdot83$; $\frac{37848}{456} = 83$; $\frac{378480000}{456} = 830000$

(15)

```
  457·61
    ·527
  ------
  320327
  91522
 228805
--------
241·16047
```

$477\cdot5\dot{5}8\dot{5} + 21\cdot\dot{3}5\dot{1} = \frac{4775585-4775}{9990}$

$+ \frac{21351-21}{999} = \frac{4770810\times999}{9990\times21330} = \frac{477081}{21330}$

$= \frac{53009}{2370} = 22\cdot3\dot{6}$

(16) $\frac{255\cdot67}{37} = 6\cdot91$; $\frac{2556700}{37} = 69100$; $\frac{25567}{37} = 691$

(17) 579) 20·7861 (·0359
1737
3416
2895
5211
5211

$4 \,|\, \underline{16000000}$
4000000

(18) $5\frac{81}{625} = 5\frac{16\cdot2}{125} = 5\frac{3\cdot24}{25} = 5\frac{\cdot648}{5} = 5\cdot1296$

$3\frac{37}{54} = 3\frac{4\cdot\dot{1}}{6} = 3\cdot6\dot{8}5\dot{1}$

$\cdot109375 = \frac{109375}{1000000} = \frac{21875}{200000} = \frac{4375}{40000} = \frac{875}{8000} = \frac{175}{1600} = \frac{7}{64}$

$\cdot5\dot{7}4\dot{0} = \frac{5740-5}{9990} = \frac{5735}{9990} = \frac{1147}{1998} = \frac{31\times37}{54\times37} = \frac{31}{54}$

(19) 673) ·0019517 (·0000029
1346
6057
6057

$8 \,|\, \underline{640000000}$
80000000

(20) $4\frac{173}{3125} = 4\frac{173\times8}{3125\times8} = 4\frac{1384}{25000} = 4\frac{5536}{100000} = 4\cdot05536$

$5\frac{43}{540} = 5\frac{4\cdot3}{54} = 5\frac{\cdot4\dot{7}}{6} = 5\cdot07\dot{9}6\dot{2}$

$\cdot9375 = \frac{9375}{1000} = \frac{375}{400} = \frac{15}{16}$

$\cdot4\dot{9}2\dot{5} = \frac{4925-4}{9990} = \frac{4921}{9990} = \frac{133}{270}$

(21) 12·064
3·64
8·424

79) ·0010191 (·0000129
79
229
158
711
711

(22) 5·015
3·05
1·965

128) 102400 (800
1024
00

(23) $\left(\frac{1\cdot 44}{\cdot 18} \times \frac{36}{100}\right) + \left(\frac{\cdot 36}{\cdot 05} \times \frac{6}{1}\right)$

$= \frac{144 \times 36}{18 \times 100} + \frac{3600 \times 6}{5} = \frac{144 \times 35 \times 5}{18 \times 100 \times 3600 \times 6}$

$= \frac{8}{20 \times 100 \times 6} = \frac{1}{1500} = \cdot 000\dot{6}$

(24) $\left(\frac{\cdot 052}{1\cdot 3} \times \frac{156}{100}\right) \div \left(\frac{\cdot 0624}{14\cdot 4} \times \frac{2592}{100}\right)$

$= \frac{52}{1300} \times \frac{156}{100} \times \frac{144000}{624} \times \frac{100}{2592} = \frac{4}{100} \times \frac{144000}{4 \times 2592}$

$= \frac{1440}{2592} = \frac{120}{216} = \frac{10}{18} = \frac{5}{9} = \cdot\dot{5}$

(25) ·404 − ·04 = ·364

$3\frac{23}{125} + 4\frac{23}{50} = 3\frac{184}{1000} + 4\frac{46}{100} = 3\cdot 184 + 4\cdot 46 = 7\cdot 644$

$7644\,)\,364\cdot 000000\,(\,\cdot\dot{0}4761\dot{9}$

30576

58240

53508

47320

45864

14560

7644

69160

68796

364

(26) $\frac{1}{2} = \cdot 5$

$\frac{1}{3} = \cdot 333\dot{3}$

$\cdot 03\dot{1}\dot{3}$

$\cdot 57\dot{5}\dot{7}$

$1\cdot 4\dot{4}\dot{0}4$

(27) ·4607 − ·00809 = ·45261

$6\frac{51}{80} - 5\frac{125}{128} = 6\cdot 6375 - 5\cdot 9765625 = \cdot 6609375$

$\frac{\cdot 45261}{\cdot 6609375} = \frac{4526100}{6609375} = \frac{502900}{734375} = \frac{100580}{146875} = \frac{20116}{29375}$

29375) 20116·00000 (·6848

176250

249100

235000

141000

117500

235000

235000

(28) $\frac{1}{5} = \cdot 2$

$\frac{1}{6} = \cdot 1666\dot{6}$

$1\cdot 271\dot{7}\dot{1}$

$1\cdot 353\dot{5}\dot{3}$

$2\cdot 9\dot{9}\dot{1}91$

(29) $\frac{24}{17} - \frac{14}{11\times31} = \frac{24\times341-14\times17}{17\times11\times31} = \frac{8184-238}{17\times341} = \frac{7946}{5797}$

$$5797\,)\,7946\cdot00000\,(\,1\cdot37070$$

$$\begin{array}{r}
5797\\ \hline
21490\\
17391\\ \hline
40990\\
40579\\ \hline
41100\\
40579\\ \hline
5210
\end{array}$$

(30) $\frac{27}{14} - \frac{21}{17\times31} = \frac{27\times527-21\times14}{14\times527} = \frac{14229-294}{7378} = \frac{13935}{7378}$

$$7378\,)\,13935\cdot00000\,(\,1\cdot88872$$

$$\begin{array}{r}
7378\\ \hline
65570\\
59024\\ \hline
65460\\
59024\\ \hline
64360\\
59024\\ \hline
53360\\
51646\\ \hline
17140\\
14756\\ \hline
2384
\end{array}$$

(31)
$$\begin{array}{r|l}
23\cdot07\dot{6} & 666666\\
19\cdot\dot{2}4\dot{5} & 245245\\
31\cdot2\dot{0}\dot{3} & 030303\\ \hline
73\cdot52\dot{4} & 94221\dot{4}
\end{array}$$

(32)
$$\begin{array}{r|l}
23\cdot\dot{0}7\dot{6} & 076076\\
19\cdot2\dot{4}\dot{5} & 454545\\
31\cdot20\dot{3} & 333333\\ \hline
73\cdot52\dot{4} & 8639\dot{5}4
\end{array}$$

(33)
$$\begin{array}{r|l}
29\cdot25\dot{9} & 999\\
25\cdot047 & 047\\ \hline
4\cdot21\dot{2} & 9\dot{5}2
\end{array}$$

(34) $3\cdot\dot{7} \times 4\cdot0\dot{5} = \frac{37-3}{9} \times \frac{405-40}{90} = \frac{34\times365}{9\times90} = \frac{1241}{9\times9}$

$= \frac{137\cdot\dot{8}}{9} = 15\cdot\dot{3}20987654\dot{4}$

(35) $4\cdot2\dot{7} + \cdot\dot{4}\dot{2} = \frac{427-42}{90} + \frac{42}{99} = \frac{385\times99}{90\times42} = \frac{55\times11}{10\times6}$

$= \frac{60\cdot5}{6} = 10\cdot08\dot{3}$

Ex. (liii), p. 95.

(1) 1|96 (14
1
24 | 96
96

(2) 5|29 (23
4
43 | 129
129

(3) 10|24 (32
9
62 | 124
124

(4) 56|25 (75
49
145 | 725
725

(5) 8|82|09 (297
4
49 | 482
441
587 | 4109
4109

(6) 11|90|25 (345
9
64 | 290
256
685 | 3425
3425

(7) 10|69|29 (327
9
62 | 169
124
647 | 4529
4529

(8) 75|16|89 (867
64
166 | 1116
996
1727 | 12089
12089

(9) 19|36|00 (440
16
84 | 336
336
00

(10) 69|72|25 (835
64
163 | 572
489
1665 | 8325
8325

(11) 36|37|29|61 (6031
36
1203 | 3729
3609
12061 | 12061
12061

```
(12)    22|07|12|04 ( 4698
        16
 86  |  607
     |  516
929  |   9112
     |   8361
9388 |    75104
     |    75104
```

```
(13)    5|50|18|39|36 ( 23456
        4
   43 | 150
      | 129
  464 |  2118
      |  1856
 4685 |   26239
      |   23425
46906 |    281436
      |    281436
```

```
(14)    52|56|25|00|00 ( 72500
        49
 142 |  356
     |  284
1445 |   7225
     |   7225
          0000
```

```
(15)    4|12|49|61 ( 2031
        4
 403 |  1249
     |  1209
4061 |   4061
     |   4061
```

```
(16)    54|61|21|00|00|00 ( 739000
        49
 143 |  561
     |  429
1469 |  13221
     |  13221
          000000
```

```
(17)    32|23|96|84 ( 5678
        25
  106 |  723
      |  636
 1127 |   8796
      |   7889
11348 |    90784
      |    90784
```

(18) 19|18|10|71|34|44 (437962

	16
83	318 249
867	6910 6069
8749	84171 78741
87586	543034 525516
875922	1751844 1751844

Ex. (liv), p. 96.

(1) 16·|81 (4·1

	16
81	81 81

(2) 2|81·|90|41 (16·79

	1
26	181 156
327	2590 2289
3349	30141 30141

(3) ·90|25 (·95

	81
185	925 925

(4) ·26|01 (·51

	25
101	101 101

(5) ·06|25 (·25

	4
45	225 225

(6) ·00|07|29 (·027
4
47 | 329
329

(7) 1|72|42·|31|61 (131·31
1
23 | 72
69
261 | 342
261
2623 | 8131
7869
26261 | 26261
26261

(8) 1·|00|20|01 (1·001
1
2001 | 002001
2001

(9) 4|44|15·|56|25 (210·75
4
41 | 44
41
4207 | 31556
29449
42145 | 210725
210725

(10) 1|89|47·|52|25 (137·65
1
23 | 89
69
267 | 2047
1869
2746 | 17852
16476
27525 | 137625
137625

Ex. (lv), p. 98.

(1) 20·|00|00|00|00 (4·4721
16
84 | 400
336
887 | 6400
6209
8942 | 19100
17884
89441 | 121600
89441
32159

(2) 30·|00|00|00|00 (5·4772
25
104 | 500
416
1087 | 8400
7609
10947 | 79100
76629
109542 | 247100
219084
28016

```
(3)   ·90|00|00|00 ( ·9486
       81
       ----
 184   900
       736
       -----
1888   16400
       15104
       ------
18966  129600
       113796
       ------
        15804
```

```
(4)   ·12|10|00|00 ( ·3478
        9
      -----
  64 | 310
     | 256
     |-----
 687 |  5400
     |  4809
     |------
6948 |  59100
     |  55584
     |-------
         3516
```

```
(5)   ·16|90|00|00| ( ·4110
       16
      -----
  81 |  90
     |  81
     |------
 821 |  900
     |  821
     |-------
8220 |   7900
```

```
(6)   ·01|60|00|00 ( ·1264
        1
      -----
  22 |  60
     |  44
     |------
 246 |  1600
     |  1476
     |-------
2524 |  12400
     |  10096
     |-------
         2304
```

```
(7)   ·00|06|40|00 ( ·0252
          4
        -----
  45 |  240
     |  225
     |------
 502 |  1500
     |  1004
     |------
         496
```

```
(8)   ·00|12|10|00 ( ·0347
          9
        -----
  64 |  310
     |  256
     |------
 687 |  5400
     |  4809
     |------
        591
```

(9) 16·|24|50|00|00 (4·0305
16
803 | 2450
2409
80605 | 410000
403025
6975

(10) ·99|99|99|99 (·9999
81
189 | 1899
1701
1989 | 19899
17901
19989 | 199899
179901
19998

(11) ·25|25|25|25 (·5025
25
1002 | 2525
2004
10045 | 52125
50225
1900

(12) 42·|03|33|33|33 (6·4833
36
124 | 603
496
1288 | 10733
10304
12963 | 42933
38889
129663 | 404433
388989
15444

Ex. (lvi), p. 99.

(1) $\sqrt{\frac{36}{49}} = \frac{6}{7}$ (2) $\sqrt{\frac{64}{121}} = \frac{8}{11}$ (3) $\sqrt{\frac{289}{625}} = \frac{17}{25}$

(4) 13|69 (37
9
67 | 469
469

75|69 (87
64
167 | 1169
1169

(5)

```
       1|51|29 ( 123                 18|23|29 ( 427
       1                             16
      ----                          -----
  22 | 51                       82 | 223
     | 44                          | 164
     |-----                        |------
 243 |  729                    847 |  5929
     |  729                        |  5929
     |-----                        |------
```

(6) $\sqrt{\frac{81}{16}} = \frac{9}{4} = 2\frac{1}{4}$ (7) $\sqrt{\frac{144}{25}} = \frac{12}{5} = 2\frac{2}{5}$

(8) $\sqrt{\frac{529}{169}} = \frac{23}{13} = 1\frac{10}{13}$ (9) $\sqrt{\frac{5329}{81}} = \frac{73}{9} = 8\frac{1}{9}$

(10) $\sqrt{\frac{961}{25}} = \frac{31}{5} = 6\frac{1}{5}$ (11) $\sqrt{\frac{441}{25}} = \frac{21}{5} = 4\frac{1}{5}$

(12) $\sqrt{\frac{576}{49}} = \frac{24}{7} = 3\frac{3}{7}$

(13)

```
8 | 5·000
  -------
    ·625
```

(14)

```
12 | 5·000
   -------
    ·416̇
```

```
        ·62|50|00|00 ( ·7905              ·41|66|66|66 ( ·6454
         49                                36
        -----                             -----
  149 | 1350                        124 | 566
      | 1341                            | 496
      |--------                         |-------
15805 |    90000                   1285 |  7066
      |    79025                        |  6425
      |--------                         |---------
           10975                  12904 |   64166
                                        |   51616
                                        |---------
                                            12550
```

```
(15)        6·|40|00|00|00 ( 2·5298
              4
             ----
       45 | 240
          | 225
          |------
      502 |  1500
          |  1004
          |-------
     5049 |   49600
          |   45441
          |--------
    50588 |    415900
          |    404704
          |---------
                11196
```

```
(16)   9·|50|00|00|00 ( 3·0822
       9
      -----
  608 | 5000
      | 4864
      |------
 6162 |  13600
      |  12324
      |-------
61642 |   127600
      |   123284
      |--------
            4316
```

```
(17)  17 ) 14·00000000 ( ·82352941
           136
           ---
             40
             34
             --
              60
              51
              --
               90
               85
               --
                50
                34
                --
                160
                153
                ---
                  70
                  68
                  --
                   20
                   17
                   --
```

```
          76·|82|35|29|41 ( 8·7649
          64
         -----
   167 | 1282
       | 1169
       |------
  1746 |  11335
       |  10476
       |-------
 17524 |   85929
       |   70096
       |--------
175289 |   1583341
       |   1577601
       |---------
```

Ex. (lvii), p. 101.

(1)		1		4|096
				1
	3	6	300	3096
			216	
			516	3096
(2)		3		32|768
				27
	9	2	2700	5768
			184	
			2884	5768
(3)		4		74|088
				64
	12	2	4800	10088
			244	
			5044	10088
(4)		7		493|039
				343
	21	9	14700	150039
			1971	
			16671	150039
(5)		8		614|125
				512
	24	5	19200	102125
			1225	
			20425	102125

(6)		6		262|144
				216
	18	4	10800	46144
			736	
			11536	46144

(7)		3		39|304
				27
	9	4	2700	12304
			376	
			3076	12304

(8)		7		389|017
				343
	21	3	14700	46017
			639	
			15339	46017

(9)		5		195|112
				125
	15	8	7500	70112
			1264	
			8764	70112

(10)		9		970|299
				729
	27	9	24300	241299
			2511	
			26811	241299

(11)		3		59|319
				27
	9	9	2700	32319
			891	
			3591	32319

(12)		6		250|047
				216
	18	3	10800	34047
			549	
			11349	34047

Ex. (lviii), p. 103.

(1)		2		14|706|125
				8
	6	4	1200	6706
			256	
			1456	5824
			16	
	72	5	172800	882125
			3625	
			176425	882125

(2)		5		149|721|291
				125
	15	3	7500	24721
			459	
			7959	23877
			9	
	159	1	842700	844291
			1591	
			844291	844291

```
(3)           3               28|934|443
                              27
       9      0     2700       1934
      90      7   270000       1934443
                    6349
                  276349       1934443

(4)           6               300|763|000
                              216
      18      7    10800       84763
                    1309
                   12109       84763
              0                    000

(5)               1            2|097|152
                               1
          3       2    300     1097
                        64
                       364      728
                         4
         36       8   43200    369152
                       2944
                      46144    369152

(6)               1            5|735|339
                               1
          3       7    300     4735
                       259
                       559     3913
                        49
         51       9   86700    822339
                       4671
                      91371    822339
```

(7)		4		99|252|847
				64
	12	6	4800	35252
			756	
			5556	33336
			36	
	138	3	634800	1916847
			4149	
			638949	1916847

(8)		1		1|092|727
				1
	3	0	300	92
	30	3	30000	92727
			909	
			30909	92727

(9)		2		16|777|216
				8
	6	5	1200	8777
			325	
			1525	7625
			25	
	75	6	187500	1152216
			4536	
			192036	1152216

(10)		5		194|104|539
				125
	15	7	7500	69104
			1099	
			8599	60193
			49	
	171	9	974700	8911539
			15471	
			990171	8911539

(11)		4		84|027|672
				64
	12	3	4800	20027
			369	
			5169	15507
			9	
	129	8	554700	4520672
			10384	
			565084	4520672

(12)		5		130|323|843
				125
	15	0	7500	5323
	150	7	750000	5323843
			10549	
			760549	5323843

(13)		6		322|828|856
				216
	18	8	10800	106828
			1504	
			12304	98432
			64	
	204	6	1387200	8396856
			12276	
			1399476	8396856

(14)		7		354|894|912
				343
	21	0	14700	11894
	210	8	1470000	11894912
			16864	
			1486864	11894912

(15)		8		700|227|072
				512
	24	8	19200	188227
			1984	
			21184	169472
			64	
	264	8	2323200	18755072
			21184	
			2344384	18755072

(16)		5		134|217|728
				125
	15	1	7500	9217
			151	
			7651	7651
			1	
	153	2	780300	1566728
			3064	
			783364	1566728

(17)	4		122|615|327|232
			64
12	9	4800	58615
		1161	
		5961	53649
		81	
147	6	720300	4966327
		8856	
		729156	4374936
		36	
1488	8	73804800	591391232
		119104	
		73923904	591391232

(18)	8		673|373|097|125
			512
24	7	19200	161373
		1729	
		20929	146503
		49	
261	6	2270700	14870097
		15696	
		2286396	13718376
		36	
2628	5	230212800	1151721125
		131425	
		230344225	1151721125

Ex. (lix), p. 104.

(1)	7		·389|017
			343
21	3	14700	46017
		639	
		15339	46017

∴ C. R. is ·73.

(2)		3		·048|228|544
				27
	9	6	2700	21228
			576	
			3276	19656
			36	
	108	4	388800	1572544
			4336	
			393136	1572544

∴ C. R. is ·364.

(3)		3		27|054·|036|008
				27
	9	0	2700	54
	90	0	270000	54036
	900	2	27000000	54036008
			18004	
			27018004	54036008

∴ C. R. is 30·02.

(4) $\sqrt[3]{\frac{1331}{1728}} = \frac{11}{12}$ (5) $\sqrt[3]{\frac{250}{686}} = \sqrt[3]{\frac{125}{343}} =$

(6) $\sqrt[3]{\frac{1715+13}{343}} = \sqrt[3]{\frac{1728}{343}} = \frac{12}{7} = 1\frac{5}{7}$.

(7)				405
				125
				2025
				810
				405
				50625
				28
		3		50|653
				27|
	9	7	2700	23653
			679	
			3379	23653

∴ C. R. is $\frac{37}{5}$, or, $7\frac{2}{5}$.

```
(8)          1                  5·|000|000|000
                                1
        3    7     300          4000
                   259 ⎫
                   559 ⎬        3913
                    49 ⎭
       51    0     86700          87000
      510    9     8670000        87000000
                     45981
                   8715981        78443829
∴ C. R. is 1·709....               8556171

(9)          8                    576·|000|000|000
                                  512
       24    3     19200          64000
                     729 ⎫
                   19929 ⎬        59787
                       9 ⎭
      249    2     2066700          4213000
                      4984 ⎫
                   2071684 ⎬        4143368
                         4 ⎭
     2496    0     207667200           69632000
∴ C. R. is 8·320....

(10)         4                  ·121|861|281
                                  64
       12    9     4800           57861
                   1161 ⎫
                   5961 ⎬         53649
                     81 ⎭
      147    5     720300         4212281
                     7375
                   727675         3638375
∴ C. R. is ·495....                573906
```

(11)		2		15·|926|972|504
				8
	6	5	1200	7926
			325	
			1525	7625
			25	
	75	1	187500	301972
			751	
			188251	188251
			1	
	753	6	18900300	113721504
			45216	
			18945516	113673096
				48408

∴ C. R. is 2·516....

(12)		$\frac{5}{9} = \cdot\dot{5}$		
		8		·555|555|555
				512
	24	2	19200	43555
			484	
			19684	39368
			4	
	246	2	2017200	4187555
			4924	
			2022124	4044248
				143307

∴ C. R. is ·822 . . . .

(13)		9		·750|000|000
				729
	27	0	24300	21000
	270	8	2430000	21000000
			21664	
			2451664	19613312
				1386688

∴ C. R. is ·908 . . . .

(14)		6		·333|333|333
				216
	18	9	10800	117333
			1701	
			12501	112509
			81	
	207	3	1428300	4824333
			6219	
			1434519	4303557
				520776

∴ C. R. is ·693 . . . .

(15)		1		7·|600|000|000|
				1
	3	9	300	6600
			351	
			651	6859
			81	
	57	6	108300	741000
			3456	
			111756	670536
			36	
	588	6	11524800	70464000
			35316	
			11560116	69360696
				1103304

∴ C. R. is 1·966 . . . .

```
(16)          1                    3·|200|000|000
                                   1
                                   ----
  3     4     300                  2200
              136)
              ---
              436}                 1744
               16)                 ------
              ----
 42     7     58800                 456000
               2989)
              -----
              61789}                432523
                 49)                -------
              -------
441     3     6482700                23477000
                13239
              -------
              6495939                19487817
                                     --------
∴ C. R. is 1·473 . . . .              3989183
```

Ex. (lx), p. 105.

```
(1)        53|14|41 ( 729              (2)        4|10|06|25 ( 2025
           49                                     4
          ----                                   -----
     142 | 414                              402 | 1006
         | 284                                  |  804
         |-----                                 |------
    1449 | 13041                           4045 |  20225
         | 13041                                |  20225
         |------                                |-------
and √ 729 = 27                                  and √ 2025 = 45
```

```
(3)        15|75·|29|61 ( 39·69
           9
          ----
      69 | 675                           39·|69 ( 6·3
         | 621                           36
         |-----                         -----
     786 |  5429                    123 | 369
         |  4716                        | 369
         |------                        |----
    7929 |   71361
         |   71361
         |-------
```

(4) 4|82|68|09 (2197

	4
41	82 41
429	4168 3861
4387	30709 30709

	1		2|197 1
3	3	300 99	1197
		399	1197

∴ $\sqrt[6]{4826809} = 13$

(5) 2|47|94|91|12|96 (157464

	1
25	147 125
307	2294 2149
3144	14591 12576
31486	201512 188916
314924	1259696 1259696

	5		157|464 125
15	4	7500 616	32464
		8116	32464

∴ $\sqrt{24794911296} = 54$

(6) 28|24|29·|53|64|81 (531·441

	25
103	324 309
1061	1529 1061
10624	46853 42496
106284	435764 425136
1062881	1062881 1062881

	8		531|·441 512
24	1	19200 241	19441
		19441	19441

∴ $\sqrt[6]{282429 \cdot 536481} = 8 \cdot 1$

Ex. (lxi), p. 105.

(1) $72 - 40 = 32$. (2) $56 + 34 = 90$.

(3) $126 \div 2 = 63$; $\therefore$ greater number $= 63 + 5$ or 68;
smaller number $= 63 - 5$ or 58.

(4) $6 \times 12 \times 12 - 6 \times 12 = 864 - 72 = 792$.

(5) $86 - 12 = 74$; $\therefore$ number required is $74 \div 2$, or, 37.

(6) $98 + 17 = 115$; $\therefore$ number required is $115 \div 5$, or, 23.

(7) Smaller number + (smaller number + 14) = 48;
$\therefore$ twice the smaller number + 14 = 34 + 14;
$\therefore$ twice the smaller number = 34;
$\therefore$ smaller number is 17, and greater is $17 + 14$, or, 31.

(8) Twice smaller number + 172 = 378;
twice smaller number = 206;
$\therefore$ smaller number is 103, and greater is 275.

(9) The son was born in $(1822 - 16)$, or, 1806;
the father was born in $(1868 - 93)$, or, 1775;
$\therefore$ age of the father at the son's birth was $(1806 - 1775)$,
or, 31.

(10) Number $= 41 \times 37 = 1517$.

(11) Number $= 1457 \div 47 = 31$.

(12) $\frac{5}{7}$ of the number is 35; $\therefore$ $\frac{1}{7}$ of the number is 7;
$\therefore$ the number is 49.

(13) $2 + \frac{1}{3} = \frac{7}{3}$; $\therefore$ $\frac{7}{3}$ of the number is 140;
$\therefore$ $\frac{1}{3}$ of the number is 20; $\therefore$ the number is 60.

(14) $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = \frac{13}{12}$; $\therefore$ $\frac{13}{12}$ of the number is 104;
$\therefore$ $\frac{1}{12}$ of the number is 8; $\therefore$ the number is 96.

(15) $\frac{1}{12} + \frac{1}{20} + \frac{1}{40} = \frac{19}{120}$; ∴ $\frac{19}{120}$ of the number is 38;
∴ $\frac{1}{120}$ of the number is 2; ∴ the number is 240.

(16) $\frac{1}{4} - \frac{1}{7} = \frac{3}{28}$; ∴ $\frac{3}{28}$ of the number is 30;
∴ $\frac{1}{28}$ of the number is 10; ∴ the number is 280.

(17) $\frac{1}{25} - \frac{1}{35} = \frac{2}{175}$; ∴ $\frac{2}{175}$ of the number is 8;
∴ $\frac{1}{175}$ of the number is 4; ∴ the number is 700.

(18) $1 - (\frac{1}{3} + \frac{1}{10} + \frac{1}{12}) = 1 - \frac{31}{60} = \frac{29}{60}$;
∴ $\frac{29}{60}$ of the number is 58; ∴ the number is 120.

(19) $\frac{1}{4} + \frac{1}{5} + \frac{1}{10} = \frac{33}{60}$; ∴ $\frac{33}{60}$ of the number = 33;
∴ $\frac{1}{60}$ of the number is 1; ∴ the number is 60.

(20) $(\frac{1}{4} + \frac{1}{5} + \frac{1}{6}) - \frac{1}{2} = \frac{37}{60} - \frac{30}{60} = \frac{7}{60}$;
∴ $\frac{7}{60}$ of the number is 112; ∴ $\frac{1}{60}$ of the number is 16;
∴ the number is 960.

(21) $\frac{6}{7}$ of the number is 1626; ∴ $\frac{1}{7}$ of the number is 271;
∴ the number is 1897.

(22) The smaller number is $\frac{2}{3}$ of the greater;
∴ $(1 + \frac{2}{3})$ of greater $= 5760$; ∴ $\frac{5}{3}$ of greater $= 5760$;
∴ greater number is 3456, and smaller 2304.

(23) $(1 + \frac{2}{7})$ of the greater part $= 1800$; $\frac{9}{7}$ of greater is 1800
∴ greater is 1400, and less 400.

(24) $\frac{4}{3}$ of number = 24; ∴ $\frac{1}{3}$ of number = 6;
∴ number is 18.

(25) Smaller part + (smaller part + 24) = 60;
∴ twice the smaller + 24 = 36 + 24;
∴ twice the smaller = 36;
∴ smaller = 18, and greater = 42.

(26) Smaller + ($\frac{3}{7}$ of smaller + 59) = 129;
∴ smaller + $\frac{3}{7}$ of smaller = 70.
∴ $\frac{10}{7}$ of smaller = 70;
∴ smaller = 49, and greater = 80.

(27) Divisor $= (2{\cdot}49 - {\cdot}37) \div 4 = 2{\cdot}12 \div 4 = {\cdot}53$.

(28) Dividend $= ({\cdot}027 \times 6116) + {\cdot}003 = 165{\cdot}132 + {\cdot}003$
$= 165{\cdot}135$.

(29) Twice the square of $12 = 2 \times (12 \times 12) = 288$;
the square of twice $12 = (2 \times 12) \times (2 \times 12) = 576$;
$\therefore$ difference is $576 - 288$, or, 288.

(30) $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} = \frac{11}{12}$;
$\therefore$ $\frac{1}{12}$ of the trees are cherry-trees;
$\therefore$ $\frac{1}{12}$ of trees $= 50$;
$\therefore$ number of trees is 600.

(31) A unit is $\frac{1}{25}$ of 25 units;
$\therefore$ $\frac{5}{8}$ of a unit is $\frac{5}{8}$ of $\frac{1}{25}$, or, $\frac{1}{40}$ of 25 units.

(32) $\frac{3}{4}$ of square root of number $= 21$;
$\therefore$ square root of number $= 28$;
$\therefore$ number $= 28 \times 28 = 784$.

(33) $\frac{5}{7}$ of square of number $= 140$;
$\therefore$ square of number $= 196$;
$\therefore$ number $= \sqrt{196} = 14$.

(34) $\frac{4}{5}$ of cube root of number $= 12$;
$\therefore$ cube root of number $= 15$;
$\therefore$ number $= 15 \times 15 \times 15 = 3375$.

(35) $\frac{8}{13}$ of cube of number $= 36504$;
$\therefore$ cube of number $= 4563 \times 13 = 9 \times 507 \times 13$
$= 9 \times 3 \times 169 \times 13 = 3 \times 3 \times 3 \times 13 \times 13 \times 13$;
$\therefore$ number $= 3 \times 13 = 39$.

(36) $\frac{2}{3}$ of (number $+ 21) = 23$;
$\therefore$ number $+ 21 = 34\frac{1}{2}$;
$\therefore$ number $= 13\frac{1}{2}$.

(37) $\frac{3}{5}$ of (number − 37) = 18;
∴ number − 37 = 30;
∴ number = 67.

(38) $\frac{5}{6}$ of the result is $\frac{10}{21}$;
∴ the result is $\frac{12}{21}$ or $\frac{4}{7}$;
∴ square root of the number = $\frac{4}{7} + 1\frac{2}{7} = \frac{13}{7}$;
∴ number = $\frac{13}{7} \times \frac{13}{7} = \frac{169}{49} = 3\frac{22}{49}$.

(39) Quotient = 17 + 3 = 20;
product = 20 × 3 = 60;
sum = 60 ÷ 4 = 15;
number = 15 − 2 = 13.

(40) $8 \times 8 \times 8 \times 8 \times 8 \times 8 \times 8 = 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3 \times 2^3$
= the 21st power of 2
= the cube of the 7th power of 2.

(41) $\frac{1}{2} \times \frac{1}{3} = \frac{1}{6}$
∴ square of number = 864 × 6 = 5184;
∴ number = $\sqrt{5184} = 72$.

(42) $\frac{1}{7} \times \frac{1}{8} = \frac{1}{56}$; and $298\frac{2}{3} \times 3 = 896$;
∴ square of number = 896 × 56 = 50176;
∴ number = $\sqrt{50176} = 224$.

END OF PURE ARITHMETIC.

COMMERCIAL ARITHMETIC.

Ex. (lxii), p. 110.

(1) $3\frac{1}{4}d. = 13q.$; $7\frac{1}{2}d. = 30q.$; $9d. = 36q.$; $11\frac{3}{4}d. = 47q.$

(2) $2s.\ 3d. = 27d. = 108q.$; $5s.\ 7\frac{1}{2}d. = 67\frac{1}{2}d. = 270q$
$12s.\ 9\frac{3}{4}d. = 153\frac{3}{4}d. = 615q.$; $17s.\ 7\frac{1}{4}d. = 211\frac{1}{4}d. = 845q.$

(3) £$3.\ 12s. = 72s. = 864d. = 3456q.$
£$5 = 100s. = 1200d. = 4800q.$
£$2.\ 17s.\ 6\frac{1}{2}d. = 57s.\ 6\frac{1}{2}d. = 690\frac{1}{2}d. = 2762q.$
£$17.\ 4s.\ 5\frac{3}{4}d. = 344s.\ 5\frac{3}{4}d. = 4133\frac{3}{4}d. = 16535q.$

(4) $6s. = 72d.$; $4s.\ 10d. = 58d.$; $7s.\ 10d. = 94d.$
$8s.\ 9d. = 105d.$; $13s.\ 7d. = 163d.$

(5) £$4 = 80s. = 960d.$; £$5.\ 2s.\ 4d. = 102s.\ 4d. = 1228d.$
£$17.\ 14s.\ 5d. = 354s.\ 5d. = 4253d.$;
£$58.\ 13s.\ 11d. = 1173s.\ 11d. = 14087d.$

(6) £$174.\ 10s. = 3490s. = 41880d.$;
£$432.\ 15s.\ 10d. = 8655s.\ 10d. = 103870d.$
£$1274.\ 17s.\ 9d. = 25497s.\ 9d. = 305973d.$

Ex. (lxiii), p. 111.

(1) $\frac{57}{4}d. = 14\frac{1}{4}d.$

(2) $\frac{173}{4}d. = 43\frac{1}{4}d.$

(3) $\frac{197}{4}d. = 49\frac{1}{4}d.$

(4) $\frac{357}{4}d. = 89\frac{1}{4}d. = 7s.\ 5\frac{1}{4}d.$

(5) $\frac{479}{4}d. = 119\frac{3}{4}d. = 9s.\ 11\frac{3}{4}d.$

(6) $\frac{747}{4}d. = 186\frac{3}{4}d. = 15s.\ 6\frac{3}{4}d.$

(7)
$$\begin{array}{r|l} 4 & 4238 \\ \hline 12 & 1059\ .\ 2q. \\ \hline 2{,}0 & 8{,}8\ .\ 3d. \\ \hline & £4.\ 8s.\ 3\tfrac{1}{2}d. \end{array}$$

(8)
$$\begin{array}{r|l} 4 & 376289 \\ \hline 12 & 94072\ .\ 1q. \\ \hline 2{,}0 & 783{,}9\ .\ 4d. \\ \hline & £391.\ 19s.\ 4\tfrac{1}{4}d. \end{array}$$

(9)
$$\begin{array}{r|l} 4 & 542380 \\ \hline 12 & 135595 \\ \hline 2{,}0 & 1129{,}9\ .\ 7d. \\ \hline & £564.\ 19s.\ 7d. \end{array}$$

Ex. (lxiv), p. 112.

(1) £27. 12*s*. 6*d*. = (27 × 8) + 5, or, 221 half-crowns.

(2) £2352 = $\frac{2352 \times 20}{21}$ guineas, or, 2240 guineas.

(3) 4360 guineas = $\frac{4360 \times 21}{20}$ pounds, or, 4578 pounds.

(4) 15225 half-crowns = $\frac{15225 \times 5}{21}$ half-guineas, or, 3625 half-guineas.

(5) 627 florins = (627 × 6) fourpenny pieces, or, 3762 fourpenny pieces.

(6) 246 guineas = $\frac{246 \times 21}{2}$ florins, or, 2583 florins.

(7) 42375 half-guineas = $\frac{42375 \times 21}{5}$ half-crowns, or, 177975 half-crowns.

Ex. (lxv), p. 113.

(1) $1\frac{1}{4}d.$ (2) $1\frac{3}{4}d.$ (3) $2\frac{3}{4}d.$ (4) $3\frac{3}{4}d.$
(5) $4\frac{1}{4}d.$ (6) $4\frac{3}{4}d.$ (7) $5\frac{1}{4}d.$ (8) $6\frac{3}{4}d.$
(9) $7\frac{1}{2}d.$ (10) $8\frac{3}{4}d.$ (11) $9d.$ (12) $9\frac{3}{4}d.$
(13) $10\frac{1}{2}d.$ (14) $11\frac{3}{4}d.$ (15) $14\frac{3}{4}d.$ (16) $15\frac{3}{4}d.$

(17)	17¼*d.*	(18)	18¾*d.*	(19)	21¾*d.*
(20)	23½*d.*	(21)	1*s.* 7*d.*	(22)	1*s.* 11*d.*
(23)	2*s.* 3*d.*	(24)	2*s.* 9*d.*	(25)	3*s.* 3*d.*
(26)	3*s.* 7*d.*	(27)	4*s.* 9*d.*	(28)	5*s.* 8*d.*
(29)	6*s.* 2*d.*	(30)	7*s.* 2*d.*	(31)	8*s.* 3*d.*
(32)	8*s.* 9*d.*	(33)	9*s.* 9*d.*	(34)	10*s.* 6*d.*
(35)	11*s.* 2*d.*	(36)	12*s.* 1*d.*	(37)	13*s.* 7*d.*
(38)	14*s.* 11*d.*	(39)	16*s.* 3*d.*	(40)	20*s.* 7*d.*
(41)	£1. 7*s.*	(42)	£1. 19*s.*	(43)	£2. 17*s.*
(44)	£3. 19*s.*	(45)	£4. 13*s.*	(46)	£5. 7*s.*
(47)	£6. 9*s.*	(48)	£7. 5*s.*	(49)	£8. 16*s.*
(50)	£9. 18*s.*	(51)	£11. 15*s.*	(52)	£12. 7*s.*
(53)	£12. 18*s.*	(54)	£13. 13*s.*	(55)	£14. 17*s.*
(56)	£17. 5*s.*	(57)	£18. 13*s.*	(58)	£20. 12*s.*
(59)	£21. 17*s.*	(60)	£22. 19*s.*		

Ex. (lxvi), p. 115.

(1)	10*d.*	(2)	11½*d.*	(3)	9¾*d.*
(4)	11*d.*	(5)	19*s.* 10*d.*	(6)	19*s.* 3*d.*
(7)	18*s.* 4*d.*	(8)	18*s.* 5*d.*	(9)	13*s.* 10¾*d.*
(10)	18*s.* 1½*d.*	(11)	18*s.* 6¾*d.*	(12)	18*s.* 10¼*d.*

(13)	£21. 15*s.* 1*d.*	(14)	£31. 8*s.* 0*d.*
(15)	£32. 15*s.* 2*d.*	(16)	£31. 12*s.* 9*d.*
(17)	£23. 13*s.* 8¼*d.*	(18)	£33. 18*s.* 4¾*d.*
(19)	£32. 9*s.* 3¾*d.*	(20)	£32. 6*s.* 5*d.*
(21)	£169. 5*s.* 1*d.*	(22)	£181. 18*s.* 6*d.*
(23)	£240. 19*s.* 7*d.*	(24)	£168. 11*s.*
(25)	£200. 17*s.* 11¼*d.*	(26)	£220. 6*s.* 9¾*d.*
(27)	£3602. 17*s.* 6*d.*	(28)	£14801. 0*s.* 2¾*d.*
(29)	£21906. 1*s.* 1*d.*	(30)	£10841. 11*s.* 7½*d.*
(31)	£34. 17*s.* 7¾*d.*	(32)	£341. 2*s.* 3¼*d.*
(33)	£403. 15*s.* 9¾*d.*	(34)	£3298. 11*s.* 6¼*d.*
(35)	£4393. 2*s.* 9½*d.*	(36)	£5218. 9*s.* 3¾*d.*

(37) £5042. 17*s*. 4*d*.
(38) £14203. 13*s*. 2*d*.
(39) £15170. 7*s*. 10*d*.
(40) £46110. 1*s*. 2*d*.
(41) £52597. 13*s*. 11*d*.
(42) £29275. 3*s*. 10*d*.
(43) £33739. 19*s*. 10*d*.
(44) £31713. 12*s*. 10*d*.
(45) £28702. 7*s*. 8*d*.
(46) £49097. 6*s*. 10*d*.
(47) £26061. 13*s*. 2*d*.
(48) £37974. 8*s*. 6*d*.
(49) £36009. 19*s*. 8*d*.
(50) £27924. 2*s*. 6*d*.
(51) £62725. 11*s*. 9*d*.

Ex. (lxvii), p. 119.

(1) £36. 3*s*. 5*d*.
(2) £28. 0*s*. 10*d*.
(3) £8. 18*s*. 11*d*.
(4) £238. 17*s*. 10$\frac{1}{4}$*d*.
(5) 14*s*. 1$\frac{3}{4}$*d*.
(6) £1. 16*s*. 7$\frac{3}{4}$*d*.
(7) 1$\frac{3}{4}$*d*.
(8) £1519. 12*s*. 9$\frac{1}{2}$*d*.
(9) £36108. 17*s*. 6$\frac{3}{4}$*d*.
(10) £1219. 19*s*. 10$\frac{1}{2}$*d*.

Ex. (lxviii), p. 121.

(1)
$$\begin{array}{rrr} & s. & d. \\ & 7 \;. & 3 \\ & & 4 \\ \hline \pounds 1 \;. & 9 \;. & 0 \end{array}$$

(2)
$$\begin{array}{rr} s. & d. \\ 1 \;. & 2 \\ & 5 \\ \hline s.5 \;. & 10 \end{array}$$

(3)
$$\begin{array}{rr} & d. \\ & 7\frac{1}{2} \\ & 6 \\ \hline s.3 \;. & 9 \end{array}$$

(4)
$$\begin{array}{rrr} & s. & d. \\ & 9 \;. & 6 \\ & & 7 \\ \hline \pounds 3 \;. & 6 \;. & 6 \end{array}$$

(5)
$$\begin{array}{rr} s. & d. \\ 2 \;. & 4 \\ & 8 \\ \hline s.18 \;. & 8 \end{array}$$

(6)
$$\begin{array}{rrr} & s. & d. \\ & 2 \;. & 2\frac{1}{2} \\ & & 10 \\ \hline \pounds 1 \;. & 2 \;. & 1 \end{array}$$

(7)
$$\begin{array}{rrr} \pounds & s. & d. \\ 2 \;. & 1 \;. & 4 \\ & & 11 \\ \hline \pounds 22 \;. & 14 \;. & 8 \end{array}$$

(8)
$$\begin{array}{rrr} \pounds & s. & d. \\ 1 \;. & 4 \;. & 3 \\ & & 12 \\ \hline \pounds 14 \;. & 11 \;. & 0 \end{array}$$

(9)

	s.	d.
	17	6
		2
1	15	0
		7
£12	5	0

(10)

	s.	d.
	7	10½
		3
1	3	7½
		5
£5	18	1½

(11)

£	s.
1	7
	2
2	14
	8
£21	12

(12)

	s.	d.
	17	6
		2
1	15	0
		9
£15	15	0

(13)

£	s.	d.
5	11	4
		4
22	5	4
		5
£111	6	8

(14)

	s.	d.
	5	7½
		3
	16	10½
		7
£5	18	1½

(15)

£	s.	d.
5	11	4
		2
11	2	8
		11
£122	9	4

(16)

£	s.	d.
4	7	2
		6
26	3	0
		4
£104	12	0

(17)

	s.	d.
	4	6
		5
1	2	6
		5
£5	12	6

(18)

	s.	d.
	5	11½
		3
	17	10½
		9
£8	0	10½

(19)
$$\begin{array}{rrr} & s. & d. \\ & 2\,. & 8 \\ & & 4 \\ \hline & 10\,. & 8 \\ & & 7 \\ \hline \pounds 3\,. & 14\,. & 8 \end{array}$$

(20)
$$\begin{array}{rr} \pounds & s. \\ 1\,. & 12 \\ & 5 \\ \hline 8\,. & 0 \\ & 6 \\ \hline \pounds 48\,. & 0 \end{array}$$

(21)
$$\begin{array}{rr} \pounds & s. \\ 1\,. & 2 \\ & 3 \\ \hline 3\,. & 6 \\ & 11 \\ \hline \pounds 36\,. & 6 \end{array}$$

(22)
$$\begin{array}{rrr} \pounds & s. & d. \\ 1\,. & 2\,. & 6 \\ & & 5 \\ \hline 5\,. & 12\,. & 6 \\ & & 7 \\ \hline \pounds 39\,. & 7\,. & 6 \end{array}$$

(23)
$$\begin{array}{rrr} & s. & d. \\ & 6\,. & 2\tfrac{1}{2} \\ & & 4 \\ \hline 1\,. & 4\,. & 10 \\ & & 9 \\ \hline \pounds 11\,. & 3\,. & 6 \end{array}$$

(24)
$$\begin{array}{rrr} \pounds & s. & d. \\ 1\,. & 12\,. & 6 \\ & & 6 \\ \hline 9\,. & 15\,. & 0 \\ & & 7 \\ \hline \pounds 68\,. & 5\,. & 0 \end{array}$$

(25)
$$\begin{array}{rrr} & s. & d. \\ & 19\,. & 10 \\ & & 4 \\ \hline 3\,. & 19\,. & 4 \\ & & 11 \\ \hline \pounds 43\,. & 12\,. & 8 \end{array}$$

(26)
$$\begin{array}{rrr} & s. & d. \\ & 19\,. & 4 \\ & & 9 \\ \hline 8\,. & 14\,. & 0 \\ & & 5 \\ \hline \pounds 43\,. & 10\,. & 0 \end{array}$$

(27)
$$\begin{array}{rrr} & s. & d. \\ & 3\,. & 7 \\ & & 12 \\ \hline 2\,. & 3\,. & 0 \\ & & 4 \\ \hline \pounds 8\,. & 12\,. & 0 \end{array}$$

(28)
$$\begin{array}{rrr} & s. & d. \\ & 2\,. & 5\tfrac{1}{2} \\ & & 10 \\ \hline 1\,. & 4\,. & 7 \\ & & 5 \\ \hline \pounds 6\,. & 2\,. & 11 \end{array}$$

(29)

$$\begin{array}{r}
\text{s.} \quad \text{d.} \\
3 \ . \ 2\tfrac{1}{4} \\
7 \\ \hline
1 \ . \ 2 \ . \ 3\tfrac{3}{4} \\
11 \\ \hline
£12 \ . \ 5 \ . \ 5\tfrac{1}{4}
\end{array}$$

(30)

$$\begin{array}{r}
\text{d.} \\
3\tfrac{1}{2} \\
4 \\ \hline
1 \ . \ 2 \\
8 \\ \hline
9 \ . \ 4 \\
7 \\ \hline
£3 \ . \ 5 \ . \ 4
\end{array}$$

(31)

$$\begin{array}{r}
\text{d.} \\
5\tfrac{1}{2} \\
8 \\ \hline
3 \ . \ 8 \\
6 \\ \hline
1 \ . \ 2 \ . \ 0 \\
7 \\ \hline
£7 \ . \ 14 \ . \ 0
\end{array}$$

(32)

$$\begin{array}{r}
\text{s.} \quad \text{d.} \\
5 \ . \ 4 \\
9 \\ \hline
2 \ . \ 8 \ . \ 0 \\
10 \\ \hline
24 \ . \ 0 \ . \ 0 \\
4 \\ \hline
£96 \ . \ 0 \ . \ 0
\end{array}$$

(33)

$$\begin{array}{r}
\text{s.} \quad \text{d.} \\
1 \ . \ 4 \\
8 \\ \hline
10 \ . \ 8 \\
7 \\ \hline
3 \ . \ 14 \ . \ 8 \\
10 \\ \hline
£37 \ . \ 6 \ . \ 8
\end{array}$$

Ex. (lxix), p. 123.

(1)

$$\begin{array}{rl}
\text{s.} \quad \text{d.} & \\
4 \ . \ 6 & \\
4 & \\ \hline
18 \ . \ 0 & \text{for } 4 \\
7 & \\ \hline
6 \ . \ 6 \ . \ 0 & \text{for } 28 \\
4 \ . \ 6 & \text{for } 1 \\ \hline
£6 \ . \ 10 \ . \ 6 & \text{for } 29
\end{array}$$

(2)

$$\begin{array}{rl}
\text{s.} \quad \text{d.} & \\
12 \ . \ 6\tfrac{1}{2} & \\
4 & \\ \hline
2 \ . \ 10 \ . \ 2 & \text{for } 4 \\
9 & \\ \hline
22 \ . \ 11 \ . \ 6 & \text{for } 36 \\
1 \ . \ 17 \ . \ 7\tfrac{1}{2} & \text{for } 3 \\ \hline
£24 \ . \ 9 \ . \ 1\tfrac{1}{2} & \text{for } 39
\end{array}$$

(3)
s. d.
1 . $6\frac{1}{2}$
5

7 . $8\frac{1}{2}$ for 5
9

3 . 9 . $4\frac{1}{2}$ for 45
3 . 1 for 2

£3 . 12 . $5\frac{1}{2}$ for 47

(4)
s. d.
1 . 8
7

11 . 8 for 7
10

5 . 16 . 8 for 70
1 . 8 for 1

£5 . 18 . 4 for 71

(5)
s. d.
6 . 8
12

4 . 0 . 0 for 12
7

28 . 0 . 0 for 84
1 . 13 . 4 for 5

£29 . 13 . 4 for 89

(6)
s. d.
5 . $6\frac{1}{2}$
12

3 . 6 . 6 for 12
10

33 . 5 . 0 for 120
16 . $7\frac{1}{2}$ for 3

£34 . 1 . $7\frac{1}{2}$ for 123

(7)
£ s. d.
1 . 3 . 2
12

13 . 18 . 0 for 12
12

166 . 16 . 0 for 144
1 . 3 . 2 for 1

£167 . 19 . 2 for 145

(8)
£ s. d.
7 . 1 . 3
10

70 . 12 . 6 for 10
10

706 . 5 . 0 for 100
10

7062 . 10 . 0 for 1000
2

14125 . 0 . 0 for 2000
706 . 5 . 0 for 100
353 . 2 . 6 for 50
28 . 5 . 0 for 4

£15212 . 12 . 6 for 2154

	£	s.	d.	
(9)	1	18	6¾	
			10	
	19	5	7½	for 10
			10	
	192	16	3	for 100
			10	
	1928	2	6	for 1000
			3	
	5784	7	6	for 3000
	385	12	6	for 200
	19	5	7½	for 10
	£6189	5	7½	for 3210

	£	s.	d.	
(10)	2	15	4½	
			10	
	27	13	9	for 10
			10	
	276	17	6	for 100
			10	
	2768	15	0	for 1000
			2	
	5537	10	0	for 2000
	276	17	6	for 100
	193	16	3	for 70
	13	16	10½	for 5
	£6022	0	7½	for 2175

	£	s.	d.	
(11)	2	6	9¼	
			10	
	23	7	8½	for 10
			10	
	233	17	1	for 100
			10	
	2338	10	10	for 1000
			3	
	7015	12	6	for 3000
	1403	2	6	for 600
	187	1	8	for 80
	9	7	1	for 4
	£8615	3	9	for 3684

Ex. (lxx), p. 124.

(1) 6¾*d.*
(2) 1*s.* 5½*d.*
(3) 2*s.* 9¼*d.*
(4) 5*s.*
(5) 4*s.* 10½*d.*
(6) 8*s.* 7½*d.*
(7) 3*s.* 7*d.*
(8) 2*s.* 11¾*d.*
(9) 3*s.* 9*d.*

(10)	6*s*. 3¼*d*.	(11)	5*s*. 5¼*d*.	(12)	10*s*. 6½*d*.
(13)	4*s*. 3*d*.	(14)	7*s*. 6*d*.	(15)	9*s*. 9*d*.
(16)	11*s*. 3*d*.	(17)	14*s*. 6*d*.	(18)	16*s*. 9*d*.
(19)	17*s*. 3*d*.	(20)	19*s*. 9*d*.	(21)	4*s*. 10½*d*.
(22)	6*s*. 1½*d*.	(23)	9*s*. 8¼*d*.	(24)	11*s*. 4*d*.
(25)	7*s*. 9½*d*.	(26)	14*s*. 7½*d*.	(27)	13*s*. 0¾*d*.
(28)	9*s*. 7*d*.	(29)	5*s*. 5*d*.	(30)	9*s*. 11*d*.
(31)	15*s*. 1½*d*.	(32)	£1. 10*s*. 0½*d*.	(33)	£1. 6*s*. 5¾*d*.
(34)	£1. 10*s*. 5½*d*.	(35)	10*s*. 8¼*d*.	(36)	£1. 1*s*. 3½*d*.
(37)	£1. 10*s*. 9¾*d*.	(38)	£2. 1*s*. 3*d*.	(39)	£3. 14*s*. 9¼*d*.

Ex. (lxxi), p. 126.

I.

(1)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 3 & 1\ . & 3\ . & 7\frac{1}{2} \\ \hline & & 7\ . & 10\frac{1}{2} \end{array}$$

(2)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 7 & 39\ . & 7\ . & 6 \\ \hline & 5\ . & 12\ . & 6 \end{array}$$

(3)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 12 & 11\ . & 3\ . & 6 \\ \hline & & 18\ . & 7\frac{1}{2} \end{array}$$

(4)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 11 & 43\ . & 12\ . & 8 \\ \hline & 3\ . & 19\ . & 4 \end{array}$$

(5)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 10 & 6\ . & 2\ . & 11 \\ \hline & & 12\ . & 3\frac{1}{2} \end{array}$$

(6)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 12 & 22\ . & 11\ . & 6 \\ \hline & 1\ . & 17\ . & 7\frac{1}{2} \end{array}$$

II.

(1)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 6 & 98\ . & 11\ . & 9 \\ \hline 9 & 16\ . & 8\ . & 7\frac{1}{2} \\ \hline & 1\ . & 16\ . & 6\frac{1}{6} \end{array}$$

(2)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 7 & 13\ . & 7\ . & 9 \\ \hline 9 & 1\ . & 18\ . & 3 \\ \hline & & 4\ . & 3 \end{array}$$

(3)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 12 & 29\ . & 14\ . & 0 \\ \hline 9 & 2\ . & 9\ . & 6 \\ \hline & & 5\ . & 6 \end{array}$$

(4)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ 12 & 15\ . & 8\ . & 0 \\ \hline 11 & 1\ . & 5\ . & 8 \\ \hline & & 2\ . & 4 \end{array}$$

(5)

	£	s.	d.
	3	9	4½
5		7	8½
		1	6½

(6)

	£	s.	d.
4	43	12	8
11	10	18	2
		19	10

III.

(1) 145) £167 . 19s. . 2d. (£1
145
22
20
459 (3s.
435
24
12
290 (2d.
290

Quotient £1. 3s. 2d.

(2) 241) £40 . 8s. . 4¼d.
20
808 (3s.
723
85
12
1024 (4d.
964
60
4
241 (1q.
241

Quotient 3s. 4¼d.

(3) 365) £453 . 11s. . 9¼d. (£1
365
88
20
1771 (4s.
1460
311
12
3741 (10d.
3650
91
4
365 (1q.
365

Quotient £1. 4s. 10¼d.

(4) 9652) £40669 . 2s. . 1d. (£4
38608
2061
20
41222 (4s.
38608
2614
12
31369 (3d.
28956
2413
4
9652 (1q.
9652

Quotient £4. 4s. 3¼d

(5)

```
          £     s.    d.
   291 ) 93  .  1  .  2¼
         20
        ----
        1861 ( 6s.
        1746
        ----
         115
          12
        ----
        1382 ( 4d.
        1164
        ----
         218
           4
        ----
         873 ( 3q.
         873
        ----
```

Quotient 6s. 4¾d.

(6)

```
          £     s.    d.
   117 ) 139 .  3  .  6 ( £1
         117
         ---
          22
           20
         ---
         443 ( 3s.
         351
         ---
          92
          12
         ----
         1110 ( 9d.
         1053
         ----
           57
```

Quotient £1. 3s. $9\frac{19}{39}$d.

IV.

(1) $\dfrac{£13.\ 17s.\ 1\frac{1}{2}d.}{9} = £1.\ 10s.\ 9\frac{1}{2}d.$

(2) $\dfrac{£86.\ 16s.\ 4\frac{3}{4}d.}{11} = £7.\ 17s.\ 10\frac{1}{4}d.$

(3) $\dfrac{£8.\ 4s.\ 3d.}{12} = 13s.\ 8\frac{1}{4}d.$

(4) $\dfrac{£1.\ 9s.}{48} = \dfrac{7s.\ 3d.}{12} = 7\frac{1}{4}d.$

(5) $\dfrac{£53.\ 15s.\ 8d.}{112} = \dfrac{£13\ 8s.\ 11d.}{28} = \dfrac{£3.\ 7s.\ 2\frac{3}{4}d.}{7} = 9s.\ 7\frac{1}{4}d$

(6) $\dfrac{£14}{240} = \dfrac{£3.\ 10s.}{60} = \dfrac{7s.}{6} = 1s.\ 2d.$

(7) $\dfrac{£155.\ 7s.\ 6d.}{1320} = \dfrac{£15.\ 10s.\ 9d.}{132} = \dfrac{£1.\ 5s.\ 10\frac{3}{4}d.}{11} = 2s.\ 4\frac{1}{4}d.$

(8)
£ . s. . d.
58) 122 . 15 . 4 (£2
116
6
20
135 (2s.
116
19
12
232 (4d.
232

Quotient £2. 2s. 4d.

(9)
£ . s. . d.
95) 70 . 3 . $2\frac{3}{4}$
20
1403 (14s.
95
453
380
73
12
878 (9d.
855
23
4
95 (1q.
95

Quotient 14s. $9\frac{1}{4}$d.

(10)
£ . s. . d.
117) 167 . 4 . 3 (£1
117
50
20
1004 (8s.
936
68
12
819 (7d.
819

Quotient £1. 8s. 7d.

(11)
£ . s. . d.
125) 71 . 10 . 6
20
1430 (11s.
125
180
125
55
12
666 (5d.
625
41

Quotient 11s. $5\frac{41}{125}$d.

(12)
$$\begin{array}{r|l}
 & \pounds \quad\; s. \quad d. \\
216) & 120 \;.\; 10 \;.\; 7 \\
 & \;\;20 \\ \cline{2-2}
 & 2410 \;(\,11s. \\
 & 2376 \\ \cline{2-2}
 & \;\;\;34 \\
 & \;\;\;12 \\ \cline{2-2}
 & \;\;415 \;(\,1d. \\
 & \;\;216 \\ \cline{2-2}
 & \;\;199
\end{array}$$

Quotient 11*s*. $1\frac{199}{216}$*d*.

(13)
$$\begin{array}{r|l}
 & \pounds \quad\;\; s. \quad d. \\
504) & 2184 \;.\; 17 \;.\; 8 \;(\,\pounds 4 \\
 & 2016 \\ \cline{2-2}
 & \;\;168 \\
 & \;\;\;\;20 \\ \cline{2-2}
 & 3377 \;(\,6s. \\
 & 3024 \\ \cline{2-2}
 & \;\;353 \\
 & \;\;\;\;12 \\ \cline{2-2}
 & 4244 \;(\,8d. \\
 & 4032 \\ \cline{2-2}
 & \;\;212
\end{array}$$

Quotient £4. 6*s*. $8\frac{53}{126}$*d*.

Ex. (lxxii), p. 128.

(1) £346. 16*s*. = 6936*s*.; £34680 = (34680 × 20)*s*.

$\frac{34680 \times 20}{6936} = 5 \times 20 = 100$

(2) £5. 11*s*. 4*d*. = 1336*d*.; £122. 9*s*. 4*d*. = 29392*d*.

$\frac{29392}{1336} = \frac{7348}{334} = \frac{3674}{167} = 22$

(3) £1. 12*s*. 6*d*. = 390*d*.; £68. 5*s*. 0*d*. = 16380*d*.

$\frac{16380}{390} = \frac{1638}{39} = \frac{546}{13} = 42$

(4) £17. 12*s*. $9\frac{1}{4}$*d*. = 16933*q*.; £1393. 8*s*. $10\frac{3}{4}$*d*. = 1337707*q*

$\frac{1337707}{16933} = \frac{191101}{2419} = 79$

(5) £641. 14*s*. $11\frac{1}{4}$*d*. = 616077*q*.; £2. 15*s*. $6\frac{3}{4}$*d*. = 2667*q*.

$616077 \div 2667 = 231$

(6) £1 + 10*s*. + 2*s*. 6*d*. + 1*s*. + 6*d*. = 34*s*., and £17 = (20 × 17)*s*.

∴ number of each coin = $\frac{20 \times 17}{34} = \frac{20}{2} = 10$

Ex. (lxxiii), p. 129.

(1) $\frac{3 \times 4s.\ 9d.}{4} = \frac{14s.\ 3d.}{4} = 3s.\ 6\frac{3}{4}d.$

(2) $\frac{5 \times 7s.\ 2d.}{8} = \frac{35s.\ 10d.}{8} = 4s.\ 5\frac{3}{4}d.$

(3) $\frac{5 \times 21s.}{16} = \frac{105s.}{16} = \frac{52s.\ 6d.}{8} = 6s.\ 6\frac{3}{4}d.$

(4) $\frac{2 \times 3s.\ 6d.}{7} = \frac{7s.}{7} = 1s.$

(5) $\frac{1}{2}$ of $\frac{3}{4}$ of $4s.\ 10d. = \frac{3 \times 4s.\ 10d.}{8} = \frac{14s.\ 6d.}{8} = 1s.\ 9\frac{3}{4}d.$

(6) $\frac{8 \times \pounds 83.\ 16s.\ 3d.}{3 \times 9} = \frac{8 \times \pounds 27.\ 18s.\ 9d.}{9} = 8 \times \pounds 3.\ 2s.\ 1d.$
$= \pounds 24.\ 16s.\ 8d.$

(7) $9\frac{1}{3}$ of $1s.\ 1\frac{1}{2}d. = \frac{28}{3}$ of $13\frac{1}{2}d. = 28 \times 4\frac{1}{2}d. = 126d. = 10s.\ 6d.$

(8) $\frac{88}{15}$ of $30d. = 88 \times 2d. = 176d. = 14s.\ 8d.$

(9) $2\frac{3}{5}$ of $\pounds 5.\ 2s.\ 6d. = \frac{13}{5}$ of $\pounds 5.\ 2s.\ 6d. = 13 \times \pounds 1.\ 0s.\ 6d.$
$= \pounds 13.\ 6s.\ 6d.$

(10) $\frac{27 \times 1994s.}{56} = \frac{27 \times 997s.}{28} = \frac{26919s.}{28} = 961\frac{11}{28}s. = \pounds 48.\ 1s.\ 4\frac{5}{7}d.$

(11) $\frac{103 \times 7748d.}{45} = \frac{798044d.}{45} = 17734\frac{14}{45}d. = \pounds 73.\ 17s.\ 10\frac{14}{45}d.$

(12) $\frac{8 \times 17 \times \pounds 17.\ 7s.\ 6d.}{3 \times 5} = 136 \times \pounds 1.\ 3s.\ 2d. = \pounds 157.\ 10s.\ 8d.$

(13) $\frac{5 \times \pounds 257.\ 2s.\ 3d.}{12} = \frac{\pounds 1285.\ 11s.\ 3d.}{12} = \pounds 107.\ 2s.\ 7\frac{1}{4}d.$

(14) $\frac{7 \times \pounds 425.\ 3s.\ 9d.}{15} = \frac{\pounds 2976.\ 6s.\ 3d.}{15} = \pounds 198.\ 8s.\ 5d.$

(15) $\frac{70 \times \pounds 101.\ 17s.\ 5d.}{23} = 70 \times \pounds 4.\ 8s.\ 7d. = \pounds 310.\ 0s.\ 10d.$

(16) $\dfrac{193 \times \pounds 17.\ 7s.\ 7\frac{1}{4}d.}{47} = 193 \times 7s.\ 4\frac{3}{4}d. = \pounds 71.\ 7s.\ 4\frac{3}{4}d.$

(17) $\dfrac{9 \times \pounds 60.\ 1s.\ 8d.}{7} = 9 \times \pounds 8.\ 11s.\ 8d. = \pounds 77.\ 5s.\ 0d.$

(18) $\dfrac{3 \times \pounds 2.\ 6s.\ 9d.}{4} = 3 \times 11s.\ 8\frac{1}{4}d. = \pounds 1.\ 15s.\ 0\frac{3}{4}d.$

(19) $\dfrac{17 \times \pounds 53.\ 15s.\ 8d.}{112} = 17 \times 9s.\ 7\frac{1}{4}d. = \pounds 8.\ 3s.\ 3\frac{1}{4}d.$

(20) $\dfrac{5 \times \pounds 36.\ 2s.\ 9d.}{21} = 5 \times \pounds 1.\ 14s.\ 5d. = \pounds 8.\ 12s.\ 1d.$

Ex. (lxxiv), p. 130.

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(1) & 245\ . & 13\ . & 4 & \\
 & & & 5\frac{3}{4} & \\
\hline
4\ | & 737\ . & 0\ . & 0 & \\
\hline
 & 184\ . & 5\ . & 0 & \text{for } \frac{3}{4} \\
 & 1238\ . & 6\ . & 8 & \text{for } 5 \\
\hline
 & \pounds 1412\ . & 11\ . & 8 & \text{for } 5\frac{3}{4}
\end{array}$$

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(2) & 439\ . & 18\ . & 3 & \\
 & & & 7\frac{1}{3} & \\
\hline
 & 146\ . & 12\ . & 9 & \text{for } \frac{1}{3} \\
 & 3079\ . & 7\ . & 9 & \text{for } 7 \\
\hline
 & \pounds 3226\ . & 0\ . & 6 & \text{for } 7\frac{1}{3}
\end{array}$$

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(3) & 4214\ . & 15\ . & 2 & \\
 & & & 6\frac{5}{7} & \\
\hline
7\ | & 21073\ . & 15\ . & 10 & \\
\hline
 & 3010\ . & 10\ . & 10 & \text{for } \frac{5}{7} \\
 & 25288\ . & 11\ . & 0 & \text{for } 6 \\
\hline
 & \pounds 28299\ . & 1\ . & 10 & \text{for } 6\frac{5}{7}
\end{array}$$

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(4) & 8629\ . & 12\ . & 8 & \\
 & & & 3\frac{5}{8} & \\
\hline
8\ | & 43148\ . & 3\ . & 4 & \\
\hline
 & 5393\ . & 10\ . & 5 & \text{for } \frac{5}{8} \\
 & 25888\ . & 18\ . & 0 & \text{for } 3 \\
\hline
 & \pounds 31282\ . & 8\ . & 5 & \text{for } 3\frac{5}{8}
\end{array}$$

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(5) & 7258\ . & 17\ . & 6 & \\
 & & & 2\frac{3}{5} & \\
\hline
5\ | & 21776\ . & 12\ . & 6 & \\
\hline
 & 4355\ . & 6\ . & 6 & \text{for } \frac{3}{5} \\
 & 14517\ . & 15\ . & 0 & \text{for } 2 \\
\hline
 & \pounds 18873\ . & 1\ . & 6 & \text{for } 2\frac{3}{5}
\end{array}$$

$$\begin{array}{rrrrl}
 & \pounds & s. & d. & \\
(6) & 4372\ . & 19\ . & 4 & \\
 & & & 6\frac{3}{8} & \\
\hline
8\ | & 13118\ . & 18\ . & 0 & \\
\hline
 & 1639\ . & 17\ . & 3 & \text{for } \frac{3}{8} \\
 & 26237\ . & 16\ . & 0 & \text{for } 6 \\
\hline
 & \pounds 27877\ . & 13\ . & 3 & \text{for } 6\frac{3}{8}
\end{array}$$

Ex. (lxxv), p. 131.

(1)
hr. min. sec.
6 . 17 . 25
60
377 min.
60
22645 sec.

hr. min. sec.
17 . 0 . 43
60
1020
60
61243 sec.

(2)
yr. da. hr.
3 . 143 . 16
365
1238 da.
24
4968
2476
29728 hr.
60
1783680 min.
60
107020800 sec.

yr. da. hr. min.
1 . 13 . 0 . 4
365
378 da.
24
1512
756
9072 hr.
60
544324 min.

(3)
min.
6,0 | 4856,7
24 | 809 . 27 min.
33 da. 17 hr.

sec.
6,0 | 2357,6
6,0 | 39,2 . 56 sec.
6 hr. 32 min.

(4)
sec.
6,0 | 74239,2
6,0 | 1237,3 . 12 sec.
24 | 206 . 13 min.
8 da. 14 hr.

sec.
6,0 | 17429,6
6,0 | 290,4 . 56 sec.
24 | 48 . 24 min.
2 da. 0 hr.

(5) $28+31+30+29=118$; $27+31+30+31+30+2=151$;
$28+29+31+30+31+30+31+31+30+15=286$
$5+31+30+31+23=120$; $6+31+28+31+30+25=151$

(6) 76 hr. 34 min. 36 sec.
(7) 136 da. 1 hr. 42 min.
(8) 26 wk. 2 da. 2 hr.
(9) 22 yr. 293 da. 1 hr.
(10) 77 hr. 3 min. 41 sec.
(11) 250 da. 23 hr. 1 min. 13 sec.
(12) 2 hr. 54 min. 48 sec.
(13) 83 da. 17 hr. 47 min.
(14) 6 da. 22 hr.
(15) 298 da. 21 hr.
(16) 1 yr. 331 da. 21 hr.
(17) 5 da. 9 hr. 36 min. 46 sec.

(18)

$$\begin{array}{rcrcr}
\text{hr.} & & \text{min.} & & \text{sec.} \\
13 & . & 14 & . & 43 \\
 & & & & 7 \\
\hline
92 & . & 43 & . & 1 \\
 & & & & 5 \\
\hline
463 & . & 35 & . & 5
\end{array}
\qquad
\begin{array}{rcrcrl}
\text{hr.} & & \text{min.} & & \text{sec.} & \\
17 & . & 13 & . & 39 & \\
 & & & & 10 & \\
\hline
172 & . & 16 & . & 30 & \text{for } 10 \\
 & & & & 4 & \\
\hline
689 & . & 6 & . & 0 & \text{for } 40 \\
51 & . & 40 & . & 57 & \text{for } 3 \\
\hline
740 & . & 46 & . & 57 & \text{for } 43
\end{array}$$

(19)

$$\begin{array}{r|rcrcrcr}
 & \text{wk.} & & \text{da.} & & \text{hr.} & & \text{min.} \\
7 & 15 & . & 5 & . & 17 & . & 26 \\
\hline
7 & 2 & . & 1 & . & 19 & . & 38 \\
\hline
 & & & 2 & . & 6 & . & 14
\end{array}
\qquad
\begin{array}{l}
\text{hr.}\quad \text{min.}\quad \text{sec.} \\
14 \;.\; 56 \;.\; 41 \\
60 \\
\hline
73\,)\,896\,(\,12 \text{ min.} \\
876 \\
\hline
20 \\
60 \\
\hline
73\,)\,1241\,(\,17 \text{ sec.} \\
1241 \\
\hline
\end{array}$$

Ex. (lxxvi), p. 133.

(1)

$$\begin{array}{l}
\text{yd.}\ \ \text{ft.} \\
3\ .\ 2 \\
3 \\
\hline
11\ \text{ft.} \\
12 \\
\hline
132\ \text{in.}
\end{array}
\qquad\qquad
\begin{array}{l}
\text{mi.}\ \ \text{fur.}\ \ \text{po.} \\
4\ .\ 3\ .\ 4 \\
8 \\
\hline
35\ \text{fur.} \\
40 \\
\hline
1404\ \text{po.} \\
5\frac{1}{2} \\
\hline
702 \\
7020 \\
\hline
7722\ \text{yd.} \\
3 \\
\hline
23166\ \text{ft.}
\end{array}$$

(2)

$$\begin{array}{l}
\text{mi.}\ \ \text{po.}\ \ \text{yd.} \\
7\ .\ 14\ .\ 3\frac{1}{2} \\
8 \\
\hline
56\ \text{fur.} \\
40 \\
\hline
2254\ \text{po.} \\
5\frac{1}{2} \\
\hline
1127 \\
11270 \\
3\frac{1}{2} \\
\hline
12400\frac{1}{2}\ \text{yd.} \\
3 \\
\hline
37201\frac{1}{2}\ \text{ft.} \\
12 \\
\hline
446418\ \text{in.}
\end{array}
\qquad\qquad
\begin{array}{l}
\text{po.}\ \ \text{yd.} \\
27\ .\ 4\frac{1}{4} \\
5\frac{1}{2} \\
\hline
13\frac{1}{2} \\
135 \\
4\frac{1}{4} \\
\hline
152\frac{3}{4}\ \text{yd.} \\
3 \\
\hline
458\frac{1}{4}\ \text{ft.} \\
12 \\
\hline
5499\ \text{in.}
\end{array}$$

```
      yd.
(3)  74325
         2
   ________
11 | 148650
   |______________
     13513 po. . 3½ yd.
```

```
        in.
12 | 2423694
   |__________
 3 | 201974 . 6 in.
   |__________
   |  67324 . 2 ft.
   |      2
   |__________
11 | 134648
   |__________
4,0|  1224,0 . 4 yd.
   |__________
     306 fur. 0 po.
```

```
          ft.
(4)  3 | 723964
       |__________
       | 241321 . 1 ft.
       |      2
       |__________
    11 | 482642
       |__________
   4,0 |  4387,6 . 3 yd.
       |__________
     8 |  1096  . 36 po.
       |__________
          137 mi.
```

```
        in.
12 | 82976432
   |__________
 3 | 6914702 . 8 in.
   |__________
   | 2304900 . 2 ft.
   |       2
   |__________
11 | 4609800
   |__________
4,0|  41907,2 . 4 yd.
   |__________
 8 |  10476  . 32 po.
   |__________
     1309 mi. . 4 fur.
```

(5) 107 yd. 1 ft. 8 in.

(6) 154 mi. 2 fur. 20 po.

(7) 23 fur. 21 po. 4¼ yd.

(8) 75 yd. 8 in.

(9) 50 mi. 2 fur. 35 po.

(10) 35 po. 3 yd.

```
      yd. ft. in.
(11)  7 . 2 . 9
             11
     ___________
     87 . 0 . 3
```

```
 mi.  fur.  po.
 16 . 5 . 7
          7
____________
116 . 4 . 9
          8
____________
932 . 1 . 32
```

(12)

po. yd. ft.
32 . 3 . 1
9
293 . $2\frac{1}{2}$. 0 for 9
6
1760 . 4 . 0 for 54
97 . $4\frac{1}{2}$. 0 for 3
1858 . 3 . 0

mi. fur. po. yd.
36 . 3 . 6 . $3\frac{1}{2}$
7
254 . 6 . 6 . $2\frac{1}{2}$
7
1783 . 3 . 5 . 1

(13)

yd. ft. in.
4 | 25 . 1 . 8
6 . 1 . 2

mi. fur. po.
3 | 17 . 3 . 7
9 | 5 . 6 . $15\frac{2}{3}$
5 . $6\frac{5}{27}$

(14)

po. yd. ft. in.
4 | 14 . 2 . 1 . 8
8 | 3 . 3 . 1 . 2
2 . 1 . $5\frac{1}{2}$

mi. fur. po.
5 | 11 . 7 . 7
11 | 2 . 3 . $1\frac{2}{5}$
1 . $29\frac{12}{55}$

Ex. (lxxvii), p. 136.

(1)

ac. ro. po. sq. yd. sq. ft. sq. in.
5 . 3 . 17 . 13 . 6 . 15
4
23 ro.
40
937 po.
$30\frac{1}{4}$
$234\frac{1}{4}$
28123
$28357\frac{1}{4}$ sq. yd.
9
$255221\frac{1}{4}$ sq. ft.
144
1020899
1020884
255221
36
36751875 sq. in.

(2)

ac. po. sq. yd. sq. ft.
7 . 13 . 5 . 3
4
28 ro.
40
1133 po.
$30\frac{1}{4}$
$283\frac{1}{4}$
33995
$34278\frac{1}{4}$ sq. yd.
9
$308507\frac{1}{4}$ sq. ft.
144
1234028
1234028
308507
36
44425044 sq. in.

(3) 250 × 4840 sq. yd. = 1210000 sq. yd.;
73 × 9 × 144 sq. in. = 94608 sq. in.

(4)

$$\begin{array}{r|l}
 & \text{sq. in.} \\
12 & 5239 \\ \hline
12 & 436\ .\ 7 \\ \hline
9 & 36\ .\ 48 \\ \hline
 & 4 \text{ sq. yd.}
\end{array}
\left.\vphantom{\begin{array}{l}1\\1\end{array}}\right\} 55 \text{ sq. in.}
\qquad
\begin{array}{r|l}
 & \text{sq. yd.} \\
 & 15376 \\
 & 4 \\ \hline
11 & 61504 \\ \hline
11 & 5591\ .\ 3 \\ \hline
4{,}0 & 50{,}8\ .\ 33 \\ \hline
4 & 12\ \ .\ 28 \text{ po.} \\ \hline
 & 3 \text{ ac.}
\end{array}
\left.\vphantom{\begin{array}{l}1\\1\end{array}}\right\} 9 \text{ sq. yd.}$$

(5)

$$\begin{array}{r|l}
 & \text{sq. yd.} \\
 & 34729 \\
 & 4 \\ \hline
11 & 138916 \\ \hline
11 & 12628\ .\ 8 \\ \hline
 & 1148 \text{ po.}\, 0
\end{array}
\left.\vphantom{\begin{array}{l}1\\1\end{array}}\right\} 2 \text{ sq. yd.}
\qquad
\begin{array}{r|l}
 & \text{sq. in.} \\
12 & 562934 \\ \hline
12 & 46911\ .\ 2 \\ \hline
9 & 3909\ .\ 36 \\ \hline
 & 434\ .\ 3 \text{ sq. ft.} \\
 & 4 \\ \hline
11 & 1736 \\ \hline
11 & 157\ .\ 9 \\ \hline
 & 14 \text{ po.}\, 33
\end{array}$$

} 38 sq. in.; } 10½ sq. yd.

NOTE.—To avoid fractions, the ½ sq. yd. may be reduced to 4 sq. ft. 72 sq. in., so that the answers to the second example can be put in the form:
14 po. 10 sq. yd. 7 sq. ft.
110 sq. in.

(6) 284 ac. 2 ro. 25 po. (7) 163 sq. yd. 7 sq. ft. 91 sq. in.

(8) 112 ac. 3 ro. 33 po. 15¼ sq. yd.

(9) 1158 ac. 3 ro. 27 po. (10) 1686 ac. 1 ro. 30 po.

(11) 4760 ac. 0 ro. 28 po. (12) 27 ac. 2 ro. 36 po.

(13) 5 sq. yd. 8 sq. ft. 129 sq. in. (14) 1 ac. 2 ro. 16 po.

(15) 3 ac. 1 ro. 30 po. (16) 6 sq. yd. 7 sq. ft. 22 sq. in.

(17) 66 ac. 3 ro. 36 po.

(18)
ac. ro. po.
5 . 3 . 24
5
29 . 2 . 0
3
88 . 2 . 0

ac. ro. po.
17 . 2 . 13
10
175 . 3 . 10 for 10.
5
879 . 0 . 10 for 50
52 . 2 . 39 for 3
931 . 3 . 9 for 53

(19)
ac. ro. po.
3 | 7 . 2 . 18
7 | 2 . 2 . 6
1 . 18

ac. ro. po.
29 . 2 . 37
4
71) 118 (1 ro.
71
47
40
1917 (27 po.
142
497
497

Ex. (lxxviii), p. 137.

(1)
cub.yd. cub.ft.
7 . 13
27
202 cub. ft.

cub.yd. cub.ft. cub.in.
25 . 5 . 143
27
180
50
680 cub. ft.
1728
138383
10368
1175183 cub. in.

cub. yd. cub. in.
14 . 1374
27
98
28
378
1728
4398
756
2646
378
654558 cub. in.

(2)
$$\begin{array}{r|rl} & \text{cub. in.} & \\ 12 & 74325 & \\ \hline 12 & 6193\ .\ \ 9 & \rbrace\ \text{cub. in.} \\ \hline 12 & 516\ .\ 12 & \rbrace\ \ 21 \\ \hline & 43\text{ cub. ft.} & \end{array} \qquad \begin{array}{r|rl} 12 & 439284 & \\ \hline 12 & 36607 & \\ \hline 12 & 3050\ .\ \ 84 & \rbrace\ \text{cub. in.} \\ \hline 27 & 254\ .\ 288 & \rbrace\ \ 372 \\ \hline & 9\text{ cub. yd. . 11 cub. ft.} & \end{array}$$

(3) $5\frac{1}{4} \times 27 \times 1728$ cub. in. $= 21 \times 27 \times 432$ cub. in.
$= 244944$ cub. in.
$86\frac{3}{4} \times 1728$ cub. in. $= 347 \times 432$ cub. in. $= 149904$ cub. in.

(4) 270 cub. yd. 26 cub. ft. 1143 cub. in.

(5) 195 cub. yd. 3 cub. ft. 298 cub. in.

(6) 3558 cub. yd. 10 cub. ft. 284 cub. in.

(7) 8 cub. yd. 20 cub. ft. 1545 cub. in.

(8) 8 cub. yd. 1634 cub. in.

(9) 27 cub. yd. 7 cub. ft. 1472 cub. in.

(10)
$$\begin{array}{rcrcr} \text{cub.yd.} & & \text{cub.ft.} & & \text{cub.in.} \\ 26 & . & 5 & . & 49 \\ & & & & 3 \\ \hline 78 & . & 15 & . & 147 \\ & & & & 9 \\ \hline 707 & . & 0 & . & 1323 \end{array} \qquad \begin{array}{rcrcrl} \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} & \\ 472 & . & 17 & . & 238 & \\ & & & & 10 & \\ \hline 4726 & . & 9 & . & 652 & \text{for } 10 \\ & & & & 5 & \\ \hline 23631 & . & 19 & . & 1532 & \text{for } 50 \\ 1417 & . & 24 & . & 714 & \text{for } 3 \\ \hline 25049 & . & 17 & . & 518 & \text{for } 53 \end{array}$$

(11)
$$\begin{array}{r|rcrcr} & \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} \\ 12 & 78 & . & 13 & . & 252 \\ \hline & 6 & . & 14 & . & 1029 \end{array} \qquad \begin{array}{r|rcrcr} & \text{cub.yd.} & & \text{cub.ft.} & & \text{cub. in.} \\ 59 & 472 & . & 0 & . & 1416 \\ \hline & 8 & . & 0 & . & 24 \end{array}$$

Ex. (lxxix), p. 138.

(1)

$$\begin{array}{l}
\text{pk. gall. pt.} \\
3 \;.\; 1 \;.\; 3 \\
2 \\ \hline
7 \text{ gall.} \\
8 \\ \hline
59 \text{ pt.}
\end{array}
\qquad\qquad
\begin{array}{l}
\text{qr. bus. pk.} \\
214 \;.\; 3 \;.\; 2 \\
8 \\ \hline
1715 \text{ bus.} \\
4 \\ \hline
6862 \text{ pk.} \\
2 \\ \hline
13724 \text{ gall.} \\
8 \\ \hline
109792 \text{ pt.}
\end{array}$$

(2)

$$\begin{array}{r|l}
 & \text{pt.} \\
8 & 4234 \\ \hline
2 & 529 \;.\; 2 \text{ pt.} \\ \hline
4 & 264 \;.\; 1 \text{ gall.} \\ \hline
8 & 66 \\ \hline
 & 8 \text{ qr. } 2 \text{ bus.}
\end{array}
\qquad\qquad
\begin{array}{r|l}
 & \text{gall.} \\
2 & 3047 \\ \hline
4 & 1523 \;.\; 1 \text{ gall.} \\ \hline
8 & 380 \;.\; 3 \text{ pk.} \\ \hline
 & 47 \text{ qr. } 4 \text{ bus.}
\end{array}$$

(3) 41 gall. 1 pt. (4) 20 bus. 1 pk. 1 gall. (5) 197 qr. 3 bus.

(6) 2 qt. 1 pt. (7) 3 pk. 1 gall. (8) 6 qr. 7 bus. 3 pk.

(9)

$$\begin{array}{r}
\text{qr. bus. pk.} \\
5 \;.\; 3 \;.\; 2 \\
7 \\ \hline
38 \;.\; 0 \;.\; 2 \\
9 \\ \hline
342 \;.\; 4 \;.\; 2
\end{array}
\qquad\qquad
\begin{array}{rl}
\text{qr. bus. pk.} & \\
15 \;.\; 2 \;.\; 1 & \\
10 & \\ \hline
152 \;.\; 6 \;.\; 2 & \text{for } 10 \\
7 & \\ \hline
1069 \;.\; 5 \;.\; 2 & \text{for } 70 \\
45 \;.\; 6 \;.\; 3 & \text{for } 3 \\ \hline
1115 \;.\; 4 \;.\; 1 & \text{for } 73
\end{array}$$

(10)
gall. pt.
3 | 13 . 1
5 | 4 . 3
7

qr. bus. pk.
43) 348 . 0 . 1 (8 qr.
344
4
8
32 bus.
4
129 (3 pk.
129

Ex. (lxxx), p. 139.

(1) 27 oz. = 540 dwt. = 12960 gr.

(2) 7 lb. = 84 oz. = 1680 dwt.
14 lb. 3 oz. = 171 oz. = 3420 dwt.
25 lb. 9 oz. 5 dwt. = 309 oz. 5 dwt. = 6185 dwt.

(3)
lb. oz. dwt. gr.
3 . 10 . 7 . 5
12
46 oz.
20
927 dwt.
24
3713
1854
22253 gr.

lb. oz. dwt. gr.
7 . 4 . 17 . 15
12
88 oz.
20
1777 dwt.
24
7123
3554
42663 gr.

(4)
gr.
12 | 3145
2 | 262 . 1 gr.
2,0 | 13,1
6 oz. . 11 dwt.

gr.
12 | 42672
2 | 3556
2,0 | 177,8
12 | 88 . 18 dwt.
7 lb. 4 oz.

K

(5)

	gr.	
12	72469	
2	6039 . 1	13 gr.
2,0	301,9 . 12	
12	150 . 19 dwt.	
	12 lb. 6 oz.	

	dwt.
2,0	324,6
12	162 . 6 dwt.
	13 lb. 6 oz.

(6) 74 lb. 7 oz. (7) 30 oz. 4 dwt. 9 gr.

(8) 87 lb. 7 oz. 12 dwt. 18 gr. (9) 3 oz. 4 dwt. 21 gr.

(10) 7 lb. 9 oz. 13 dwt. (11) 9 oz. 12 dwt. 23 gr.

(12)

lb.	oz.	dwt.
7	5	9
		12
89	5	8

lb.	oz.	dwt.
6	8	19
		3
20	2	17
		7
141	7	19

(13)

oz.	dwt.	gr.	
10	16	23	
		4	
43	7	20	for 4
		9	
390	9	36	for 36
10	16	23	for 1
401	7	11	for 37

lb.	oz.	dwt.	gr.	
3	7	10	21	
			4	
14	6	3	12	for 4
			10	
145	1	15	0	for 40
3	7	10	21	for 1
148	9	5	21	for 41

(14)

	lb.	oz.	dwt.
8	16	4	16
	2	0	12

	lb.	oz.	dwt.	gr.
3	7	10	17	7
5	2	7	12	$10\frac{1}{3}$
		6	6	$11\frac{2}{3}$

(15)
```
       oz.  dwt.  gr.
(15)    9 . 17 . 8
       20
       ---
  37) 197 ( 5 dwt.
      185
      ---
       12
       24
      ---
      296 ( 8 gr.
      296
      ---
```

```
     lb.   oz.  dwt.  gr.
9 | 15 . 8 .  9 . 12
  |-----------------
7 |  1 . 8 . 18 . 20
   -----------------
         2 . 19 . 20
```

Ex. (lxxxi), p. 140.

(1) 11 cwt. = 1232 lb. = 19712 oz.

17 lb. = 272 oz. = 4352 dr.

5 tons = 100 cwt. = 11200 lb.

(2) 6 tons 7 cwt. = 127 cwt. = 14224 lb. = 227584 oz.

15 tons 2 qr. = 300 cwt. 2 qr. = 1202 qr. = 33656 lb.

(3) 3 cwt. 6 lb. 5 oz. = 342 lb. 5 oz. = 5477 oz. = 87632 dr.

3 tons 15 cwt. 7 lb. = 75 cwt. 7 lb. = 8407 lb.

(4)
```
      oz.
(4) 4 | 4763
      |-------
    4 | 1190 . 3 }
      |--------- } 11 oz.
    4 |  297 . 8 }
      |-------
    7 |   74 . 1 }
      |--------- } 17 lb.
    4 |   10 . 16}
       -------
      2 cwt. 2 qr.
```

```
       lb.
 4 | 3749
   |-------
 7 |  937 . 1  }
   |---------- } 25 lb.
 4 |  133 . 24 }
   |-------
20 |   33 . 1 qr.
    -------
   1 ton 13 cwt.
```

(5)

$$\begin{array}{r|l}
 & \text{oz.} \\
4 & 7432 \\ \hline
4 & 1858 \\ \hline
4 & 464\ .\ 8\ \text{oz.} \\ \hline
7 & 116 \\ \hline
4 & 16\ .\ 16\ \text{lb.} \\ \hline
 & 4\ \text{cwt.}
\end{array}
\qquad
\begin{array}{r|rl}
 & \text{dr.} & \\
4 & 247294 & \\ \hline
4 & 61823\ .\ 2 & \rbrace 14\ \text{dr.} \\ \hline
4 & 15455\ .\ 12 & \\ \hline
4 & 3863\ .\ 3 & \rbrace 15\ \text{oz.} \\ \hline
4 & 965\ .\ 12 & \\ \hline
7 & 241\ .\ 1 & \rbrace 13\ \text{lb.} \\ \hline
4 & 34\ .\ 12 & \\ \hline
 & 8\ \text{cwt.}\ 2\ \text{qr.} &
\end{array}$$

(6) 53 lb. 12 oz. 1 dr. (7) 45 qr. 13 lb. 15 oz.
(8) 88 cwt. 2 qr. 8 lb. (9) 150 tons 10 cwt. 1 qr.
(10) 186 cwt. 1 qr. 26 lb. (11) 1559 tons 9 cwt. 2 qr. 15 lb.
(12) 2 lb. 1 oz. 9 dr. (13) 2 qr. 25 lb. 8 oz.
(14) 1 cwt. 1 qr. 14 lb. (15) 7 tons 19 cwt. 3 qr.
(16) 6 lb. (17) 34 tons 18 cwt. 1 qr. 16 lb.

(18)

$$\begin{array}{rcrcr}
\text{cwt.} & & \text{lb.} & & \text{oz.} \\
17 & . & 23 & . & 14 \\
 & & & & 7 \\ \hline
120 & . & 55 & . & 2
\end{array}
\qquad
\begin{array}{rcr}
\text{cwt.} & & \text{lb.} \\
4 & . & 17 \\
 & & 5 \\ \hline
20 & . & 85 \\
 & & 9 \\ \hline
186 & . & 93
\end{array}$$

(19)

$$\begin{array}{rcrcrl}
\text{cwt.} & & \text{qr.} & & \text{lb.} & \\
6 & . & 3 & . & 5 & \\
 & & & & 4 & \\ \hline
27 & . & 0 & . & 20 & \text{for } 4 \\
 & & & & 5 & \\ \hline
135 & . & 3 & . & 16 & \text{for } 20 \\
20 & . & 1 & . & 15 & \text{for } 3 \\ \hline
156 & . & 1 & . & 3 & \text{for } 23
\end{array}
\qquad
\begin{array}{rcrl}
\text{oz.} & & \text{dr.} & \\
10 & . & 9 & \\
 & & 4 & \\ \hline
42 & . & 4 & \text{for } 4 \\
 & & 9 & \\ \hline
380 & . & 4 & \text{for } 36 \\
10 & . & 9 & \text{for } 1 \\ \hline
390 & . & 13 & \text{for } 37
\end{array}$$

(20)

$$\begin{array}{r|r}
 & \text{cwt. qr. lb.} \\
12 & 14\ .\ 2\ .\ 8 \\ \hline
 & 1\ .\ 0\ .\ 24
\end{array}$$

$$\begin{array}{r|r}
 & \text{tons. cwt. qr. lb.} \\
4 & 32\ .\ 15\ .\ 1\ .\ 0 \\ \hline
10 & 8\ .\ 3\ .\ 3\ .\ 7 \\ \hline
 & 16\ .\ 1\ .\ 14\frac{7}{10}
\end{array}$$

(21)

cwt. qr. lb.
16 . 3 . 9
4
65) 67 (1 qr.
65
2
28
65 (1 lb.
65

tons. cwt. qr. lb.
17) 37 . 4 . 3 . 7 (2 tons.
34
3
20
64 (3 cwt.
51
13
4
55 (3 qr.
51
4
28
119 (7 lb.
119

Ex. (lxxxii), p. 142.

(1) $5\frac{1}{4}$*d.*	(2) 4*d.*	(3) $9\frac{3}{4}$*d.*	(4) $5\frac{3}{4}$*d.*	(5) $3\frac{1}{4}$*d.*
(6) 4*s.*	(7) 7*s.*	(8) 12*s.*	(9) 14*s.*	(10) 9*s.*

Ex. (lxxxiii), p. 143.

(1)

$$\begin{array}{r|r}
 & \text{cwt. qr. lb.} \\
 & 3\ .\ 2\ .\ 12 \\
 & 3\frac{2}{3} \\ \hline
3 & 6\ .\ 4\ .\ 24 \\ \hline
 & 2\ .\ 1\ .\ 17\frac{1}{3} \\
 & 10\ .\ 3\ .\ 8 \\ \hline
 & 13\ .\ 0\ .\ 25\frac{1}{3}
\end{array}$$

(2)

$$\begin{array}{r}
\text{lb. oz. dr.} \\
6\ .\ 5\ .\ 4 \\
2\frac{1}{5} \\ \hline
1\ .\ 4\ .\ 4 \\
12\ .\ 10\ .\ 8 \\ \hline
13\ .\ 14\ .\ 12
\end{array}$$

(3) mi. fur. po.
4 . 3 . 10
2

8 . 6 . 20 for 2
9

79 . 2 . 20 for 18
7 . 2 for $\frac{1}{5}$

80 . 1 . 22

(4) yd. ft. in.
15 . 2 . 3
4

63 . 0 . 0 for 4
10

630 . 0 . 0 for 40
47 . 0 . 9 for 3
2 . 0 . 9 for $\frac{1}{7}$

679 . 1 . 6

(5) ac. ro. po.
37 . 3 . 8
$4\frac{5}{12}$

12 | 189 . 0 . 0

15 . 3 . 0 for $\frac{5}{12}$
151 . 0 . 32 for 4

166 . 3 . 32

(6) ac. ro. po.
25 . 2 . 15
4

102 . 1 . 20 for 4
7

716 . 2 . 20 for 28
25 . 2 . 15 for 1
15 . 1 . 17 for $\frac{3}{5}$

757 . 2 . 12

(7) sq. yd. sq. ft. sq. in.
27 . 7 . 36
$2\frac{5}{6}$

6 | 138 . 9 . 36

23 . 1 . 78 for $\frac{5}{6}$
55 . 5 . 72 for 2

78 . 7 . 6

Ex. (lxxxiv), p. 143.

(1) cwt. qr. lb.
5 . 2 . 11
4

11 | 22 . 1 . 16

2 . 0 . 4

(2) lb. oz. dr.
7 . 4 . 14
3

2 | 21 . 14 . 10

17 | 10 . 15 . 5

10 . 5

```
        mi.  fur.  po.
(3)      7 .  2 .  12
                   12
     -----------------
  53) 87 .  3 .  24 ( 1 mi.
      53
      --
      34
       8
     ---
     275 ( 5 fur.
     265
     ---
      10
      40
      ---
      424 ( 8 po.
      424
      ---
```

```
         yd.  ft.  in.
(4)      17 .  1 .  3
                    2
       ----------------
   11 | 34 .  2 .  6
       ----------------
         3 .  0 .  6
```

```
          ac.  ro.  po.
(5)       25 .  2 .  12
                      7
       ------------------
  31 ) 179 .  0 .   4 ( 5 ac.
       135
       ---
        24
         4
        --
        96 ( 3 ro.
        93
        --
         3
        40
        ---
        124 ( 4 po.
        124
        ---
```

```
          ac.  ro.  po.
(6)       14 .  3 .  8
                     9
       ------------------
  74 ) 133 .  0 .  32 ( 1 ac.
        74
       ---
        59
         4
       ---
       236 ( 3 ro.
       222
       ---
        14
        40
        ---
        592 ( 8 po.
        592
        ---
```

(7)
$$\begin{array}{r|l} & \text{sq. yd. sq. ft. sq. in.} \\ & 107 \;.\; 4 \;.\; 132 \\ & \qquad\qquad\quad 5 \\ \hline 92) & 537 \;.\; 6 \;.\; 84\,(5 \text{ sq. yd.} \\ & 460 \\ \hline & 77 \\ & 9 \\ \hline & 699\,(7 \text{ sq. ft.} \\ & 644 \\ \hline & 55 \\ & 144 \\ \hline & 804 \\ & 720 \\ \hline & 8004\,(87 \text{ sq. in.} \\ & 736 \\ \hline & 644 \\ & 644 \\ \hline \end{array}$$

Ex. (lxxxv), p. 144.

(1) $\frac{2}{3}$ of 20*s*. = $\frac{40s.}{3}$ = 13*s*. 4*d*.
$\frac{5}{8}$ of 50*s*. = $\frac{125s.}{4}$ = £1. 11*s*. 3*d*.
$\frac{3}{7}$ of £5. 18*s*. 5*d*. = 3 × (16*s*. 11*d*.) = £2. 10*s*. 9*d*.

(2) $\frac{4}{5}$ of 8 fur. = $\frac{32\text{ fur.}}{5}$ = 6 fur. 16 po.
$\frac{3}{16}$ of 4 ro. = $\frac{12\text{ ro.}}{16}$ = $\frac{3\times 40\text{ po.}}{4}$ = 30 po.
$\frac{5}{8}$ of 4 qr. = $\frac{5\text{ qr.}}{2}$ = 2 qr. 14 lb.

(3) $\frac{14}{5}$ of £54. 9*s*. 8*d*. = 14 × (£10. 17*s*. 11$\frac{1}{5}$*d*.) = £152. 11*s*. 0$\frac{4}{5}$*d*.
$\frac{45}{14}$ of $\frac{21}{2}$*s*. = $\frac{135}{4}$*s*. = £1. 13*s*. 9*d*.
$\frac{2}{3}$ of $\frac{27}{8}$ of 1 mile = $\frac{27}{12}$ mi. = 2 mi. 2 fur.

(4) £$\frac{4\times 1\times 24\times 11\times 2470\times 21}{5\times 7\times 19\times 8\times 20}$ = £$\frac{3\times 11\times 130\times 3}{5\times 5}$ = £$\frac{2574}{5}$ = £514. 16*s*.
$\frac{2\times 1\times 9\times 21}{3\times 4\times 2}$*s*. = $\frac{189}{12}$*s*. = 15*s*. 9*d*.

(5) 12*s.* + 8*d.* + 10*s.* 2$\frac{1}{2}$*d.* = £1. 2*s.* 10$\frac{1}{2}$*d.*

(6) 2*s.* 6*d.* + 2*s.* + 9*s.* = 13*s.* 6*d.*

(7) 4 ac. 1 ro. 10 po. + 4 ac. 3 ro. 2$\frac{1}{2}$ po. + 2 ro. 1 po.
= 9 ac. 2 ro. 13$\frac{1}{2}$ po.

(8) 15 da. + 1 da. 3 hr. + 35 min. = 16 da. 3 hr. 35 min.

(9) 1 fur. 110 yd. + 146 yd. 2 ft. + 1 ft. 1$\frac{1}{2}$ in.
= 2 fur. 37 yd. 1$\frac{1}{2}$ in.

(10) 2 cwt. 0 qr. 7 lb. + 2 cwt. 2 qr. 2 lb. + 3 lb.
= 4 cwt. 2 qr. 12 lb.

Ex. (lxxxvi), p. 146.

(1) 1$\frac{3}{4}$*d.* = 7*q.*, and 6*s.* 8$\frac{1}{2}$*d.* = 322*q.*
∴ fraction = $\frac{7}{322}$ = $\frac{1}{46}$.

(2) £10. 5*s.* 4*d.* = 2464*d.*; and £11. 6*s.* 5*d.* = 2717*d.*
∴ fraction = $\frac{2464}{2717}$ = $\frac{224}{247}$.

(3) 5*s.* 6*d.* = 66*d.*; and a guinea = 252*d.*
∴ fraction = $\frac{66}{252}$ = $\frac{11}{42}$.

(4) 9*s.* 10$\frac{1}{2}$*d.* = 474*q.*; and 13*s.* 2$\frac{1}{4}$*d.* = 633*q.*
∴ fraction = $\frac{474}{633}$ = $\frac{158}{211}$.

(5) 2 da. 3 hr. 5 min. = 3065 min.; and a week = 10080 min.
∴ fraction = $\frac{3065}{10080}$ = $\frac{613}{2016}$.

(6) 2 ro. 20 po. = 100 po.; and an acre = 160 po.
∴ fraction = $\frac{100}{160}$ = $\frac{5}{8}$.

(7) 8 lb. 1 oz. 19 dwt. 9 gr. = 47025 gr.; and
13 lb. 7 oz. 5 dwt. 15 gr. = 78375 gr.
∴ fraction = $\frac{47025}{78375}$ = $\frac{3}{5}$.

(8) 2 qr. 10 lb. 7 oz. 9 dr. = 17017 dr.; and 1 qr. 7 oz. 13 dr. = 7293 dr.

$\therefore$ fraction $= \frac{7293}{17017} = \frac{3}{7}$.

(9) 4 lb. 1 oz. 8 dwt. 15 gr. = 23727 gr.; and
1 lb. 1 oz. 9 dwt. 15 gr. = 6471 gr.

$\therefore$ fraction $= \frac{6471}{23727} = \frac{3}{11}$.

(10) Measure $= \dfrac{2\frac{1}{2}}{2\frac{1}{2} \times 3} = \frac{1}{3}$

(11) Measure $= \dfrac{\frac{5}{374} \times 1760 \times 36}{5} = \frac{1760 \times 36}{374} = \frac{160 \times 18}{17} = \frac{2880}{17}$

(12) 2 ac. 37 po. = 357 po.; and 3 ac. 2 ro. 1 po. = 561 po.

$\therefore$ fraction $= \frac{561}{357} = \frac{187}{119}$.

(13) Fraction $= \dfrac{\frac{3}{8} \text{ of } 1}{21} = \frac{3}{8 \times 21} = \frac{1}{56}$

(14) Fraction $= \dfrac{2\frac{4}{9} \times 4 \times 112}{88} = \frac{22 \times 112}{9 \times 22} = \frac{112}{9}$

(15) Fraction $= \dfrac{\frac{1}{24} \times 36}{1} = \frac{36}{24} = \frac{3}{2}$

(16) Part $= \dfrac{\frac{2}{3} \times 20}{21} = \frac{2 \times 20}{3 \times 21} = \frac{40}{63}$

(17) Part $= \dfrac{\frac{2}{5} \times 1}{8} = \frac{2}{5 \times 8} = \frac{1}{20}$

(18) Fraction $= \dfrac{\frac{2}{3} \times 1298}{2 \times 1760 \times 36} = \frac{1298}{3 \times 1760 \times 36} = \frac{118}{3 \times 160 \times 36} = \frac{59}{8640}$.

(19) Part $= \dfrac{2\frac{4}{5} \times 4\frac{2}{7} \times 5}{67 \times 2} = \frac{14 \times 30 \times 5}{5 \times 7 \times 67 \times 2} = \frac{30}{67}$

(20) Fraction $= \dfrac{\frac{3}{5}\times 1682}{\frac{2}{3}\times 66\times 20} = \frac{3\times 1682}{5\times 2\times 22\times 20} = \frac{2523}{2200}$

(21) Fraction $= \dfrac{\frac{5}{12}\times 21}{\frac{12}{5}\times 5} = \frac{5\times 21}{12\times 12} = \frac{35}{48}$

Ex. (lxxxvii), p. 148.

(1)
$$\begin{array}{r} £\ \cdot 625 \\ 20 \\ \hline s.\ 12\cdot 500 \\ 12 \\ \hline d.\ 6\cdot 000 \end{array}$$

(2)
$$\begin{array}{r} £\ 15\cdot 275 \\ 20 \\ \hline s.\ 5\cdot 500 \\ 12 \\ \hline d.\ 6\cdot 000 \end{array}$$

(3)
$$\begin{array}{r} £\ \cdot 009765 \\ 20 \\ \hline s.\ \cdot 195300 \\ 12 \\ \hline d.\ 2\cdot 343600 \end{array}$$

(4)
$$\begin{array}{r} \text{cwt. } \cdot 9375 \\ 4 \\ \hline \text{qr. } 3\cdot 7500 \\ 28 \\ \hline 60000 \\ 15000 \\ \hline \text{lb. } 21\cdot 0000 \end{array}$$

(5)
$$\begin{array}{r} \text{lb. } \cdot 046875 \\ 16 \\ \hline 281250 \\ 46875 \\ \hline \text{oz. } \cdot 750000 \\ 16 \\ \hline \text{dr. } 12\cdot 000000 \end{array}$$

(6)
$$\begin{array}{r} £\ 2\cdot 003125 \\ 8 \\ \hline £\ 16\cdot 025000 \\ 20 \\ \hline s.\ \ \cdot 500000 \\ 12 \\ \hline d.\ 6\cdot 000000 \end{array}$$

(7)
$$\begin{array}{r} d.\ \cdot 425 \\ 40 \\ \hline d.\ 17\cdot 000 \end{array}$$

(8)
$$\begin{array}{r} s.\ 2\cdot 46875 \\ 23 \\ \hline 740625 \\ 493750 \\ \hline s.\ 56\cdot 78125 \\ 12 \\ \hline d.\ 9\cdot 37500 \end{array}$$

(9) $\frac{83-8}{90}$ of 5*s.* $= \frac{75\times 5}{90}$*s.* $= \frac{25}{6}$*s.* = 4*s.* 2*d.*

(10) $\frac{413-41}{90}$ of 147*d.* $= \frac{372\times 147}{90}$*d.* $= \frac{124\times 49}{10}$*d.* = 607·6*d.*
= £2. 10*s.* 7·6*d.*

```
(11)  lb. ·35
           70
      -------
  lb. 24·50
         16
      -------
  oz. 8·00
```

```
(12)  gui. 2·125
             3·5
          ------
           10625
           6375
          ------
      gui. 7·4375
               21
          -------
             4375
            8750
          -------
        s. 9·1875
               12
          -------
        d. 2·2500
                4
          -------
        q. 1·0000
```

```
(13)  cwt. 2·1372
               45
          -------
           106860
           85488
          -------
      cwt. 96·1740
                 4
          --------
       qr. ·6960
              28
          --------
            55680
            13920
          --------
       lb. 19·4880
```

(14) $\frac{5247-524}{900}$ of 1230*d.* = $\frac{4723 \times 1230}{900}$*d.* = $\frac{4723 \times 41}{30}$*d.*
= £26. 17*s.* 10$\frac{23}{30}$*d.*

```
(15)  £ ·45            d. ·75           d. 3·245
        3·5                56                  40
      -----             -----           ---------
        225               450           d. 129·800
       135               375
      -----             -----
    £ 1·575            d. 42·00
          20
      -------
    s. 11·500
           12
      -------
    d. 6·000
```

∴ £1. 11*s.* 6*d.* + 3*s.* 6*d.* + 10*s.* 9·8*d.*
= £2. 5*s.* 9·8*d.*

(16) £·7 = 14*s.*; $\cdot\dot{8}$ of 7*s.* 6*d.* = $\frac{8}{9}$ of 90*d.* = 6*s.* 8*d.*
2·45 of 20*d.* = 49·00*d.* = 4*s.* 1*d.*
∴ 14*s.* + 6*s.* 8*d.* − 4*s.* 1*d.* = 16*s.* 7*d.*

(17) $\cdot\dot{2}8571\dot{4}$ of 63*s.* = $\frac{285714}{999999}$ of 63*s.* = $\frac{2}{7}$ of 63*s.* = 18*s.*
$\cdot\dot{1}4285\dot{7}$ of 77*s.* = $\frac{142857}{999999}$ of 77*s.* = $\frac{1}{7}$ of 77*s.* = 11*s.*
$\cdot\dot{3}\dot{4}$ of 16*s.* 6*d.* = $\frac{34}{99}$ of 198*d.* = 34 × 2*d.* = 5*s.* 8*d.*
∴ 18*s.* + 11*s.* + 5*s.* 8*d.* = £1. 14*s.* 8*d.*

Ex. (lxxxviii), p. 150.

(1)
$$\begin{array}{r|l} 4 & 3\cdot00 \\ \hline 12 & 3\cdot7500 \\ \hline 20 & 16\cdot312500 \\ \hline & \cdot815625 \end{array}$$

(2)
$$\begin{array}{r|l} 12 & 4\cdot0 \\ \hline 6 & 35\cdot\dot{3} \\ \hline 7 & 5\cdot\dot{8} \\ \hline & \cdot\dot{8}4126\dot{9} \end{array}$$

(3)
$$\begin{array}{r|l} 4 & 1\cdot \\ \hline 12 & \cdot25 \\ \hline 60 & 8\cdot0208\dot{3} \\ \hline & \cdot133680\dot{5} \end{array}$$

(4) £1. 2*s.* $3\frac{1}{4}$*d.* = 1069*q.*, and £17. 16*s.* 4*d.* = 17104*q.*
∴ $\frac{1069}{17104} = \frac{1}{16} = \cdot0625.$

(5)
$$\begin{array}{r|l} 4 & 3\cdot0 \\ \hline 12 & 9\cdot75 \\ \hline 40 & 11\cdot8125 \\ \hline & \cdot2953125 \end{array}$$

(6) $\frac{2}{3}$ of £4. 6*s.* 9*d.* = 694*d.*; and £2. 10*s.* = 600*d.*
∴ $\frac{694}{600} = \frac{6\cdot94}{6} = 1\cdot15\dot{6}.$

(7) $\frac{2}{9} + 160 = \frac{1}{720} = \frac{\cdot0125}{9} = \cdot0013\dot{8}.$

(8) 5 po. 4 yd. $2\frac{1}{2}$ ft. = 97 ft., and 1 furlong = 660 ft.
∴ $\frac{97}{660} = \frac{9\cdot7}{66} = \frac{1\cdot61\dot{6}}{11} = \cdot14\dot{6}\dot{9}.$

(9) 3 qr. 3 lb. 1 oz. $12\frac{4}{9}$ dr. = $22300\frac{4}{9}$ dr. = $\frac{190704}{9}$ dr.
1 cwt. = 4 × 28 × 16 × 16 dr.
∴ $\frac{190704}{9\times4\times28\times16\times16} = \frac{7}{9} = \cdot\dot{7}.$

(10)
$$\begin{array}{r|l} 60 & 6\cdot \\ \hline 60 & 14\cdot1 \\ \hline 4 & 15\cdot235 \\ \hline 12 & 3\cdot80875 \\ \hline & \cdot3173958\dot{3} \end{array}$$

(11)
$$\begin{array}{r|l} 4 & 7\cdot \\ \hline 7 & 1\cdot75 \\ \hline 4 & 2\cdot25 \\ \hline 20 & 6\cdot5625 \\ \hline & \cdot328125 \end{array}$$

(12) $\frac{12}{12\times20\times24} = \frac{1}{20\times24} = \frac{\cdot05}{24} = \frac{\cdot0125}{6} = \cdot00208\dot{3}$

(13) £1. 19*s*. 4½*d*. = 1890*q*., and 10 guineas = (10 × 21 × 12 × 4)*q*.
$\therefore \frac{1890}{10\times21\times12\times4} = \frac{9}{12\times4} = \frac{3}{16} = \cdot1875$

(14) $\frac{\frac{3}{5}\text{ of }172}{240} = \frac{516}{1200} = \frac{5\cdot16}{12} = \cdot43$

(15) $\frac{3\cdot45\times21}{5} = \cdot69\times21 = 14\cdot49$

(16) $\frac{\frac{3}{8}\text{ of }70}{112} = \frac{3\times70}{8\times112} = \frac{15}{64} = \frac{1\cdot875}{8} = \cdot234375$

(17) $\frac{4\frac{2}{5}\text{ of }144}{12\times20} = \frac{22\times12}{5\times20} = \frac{264}{100} = 2\cdot64$

(18) $\frac{3\frac{7}{8}\text{ of }1\frac{1}{4}\text{ of }637}{20\times112} = \frac{31\times5\times91}{8\times4\times20\times16} = \frac{2821}{8\times4\times4\times16} = \frac{352\cdot625}{8\times8\times4}$
$= \frac{88\cdot15625}{8\times8} = \frac{11\cdot01953125}{8} = 1\cdot37744140625$

(19) $\frac{\frac{2}{3}\text{ of }1}{20\times12} = \frac{2}{3\times20\times12} = \frac{1}{3\times10\times12} = \frac{\cdot08\dot{3}}{3\times10} = \cdot002\dot{7}$

(20) $\frac{3\frac{3}{4}\times21}{55} = \frac{15\times21}{4\times55} = \frac{63}{4\times11} = \frac{15\cdot75}{11} = 1\cdot43\dot{1}\dot{8}$

(21) $\frac{5}{\frac{5}{12}\text{ of }40} = \frac{5\times12}{5\times40} = \frac{3}{10} = \cdot3$

(22) $\frac{441}{1000\times480} = \frac{\cdot0441}{48} = \frac{\cdot0147}{16} = \cdot00091875$

(23) £24·25 = 24·25 × 20 × 12*d*. = 5820*d*.
3·4125*s*. = 3·4125 × 12*d*. = 40·95*d*.
$\therefore \frac{5820+40\cdot95+9\cdot25}{10\times240} = \frac{5870\cdot2}{10\times240} = \frac{14\cdot6755}{6} = 2\cdot44591\dot{6}$

(24) $\frac{\frac{43}{99}\text{ of }99}{\frac{1}{90}\text{ of }9\times240} = \frac{43}{24} = \frac{10\cdot75}{6} = 1\cdot791\dot{6}$

(25) $\frac{\frac{4}{90}\text{ of }540 + \frac{23}{99}\text{ of }45}{\frac{245}{999}\text{ of }999} = \frac{24+\frac{115}{11}}{245} = \frac{379}{2695} = \cdot1406\ldots.$

Ex. (lxxxix), p. 151.

(1) £15·125 = 302·5*s.* = 3630*d.*
17·3125*s.* = 207·75*d.*
(3630 + 207·75 + 9·75)*d.* = 3847·5*d.*
$\therefore \frac{3847\cdot5}{25\times20\times12} = \frac{3847\cdot5}{1000\times6} = \frac{3\cdot8475}{6} = \cdot64125$

(2) $\frac{5}{3}$ of the money = 30*d.*
∴ $\frac{1}{3}$ of the money = 6*d.*
∴ the money = 1*s.* 6*d.*

(3) Decimal = $\frac{28}{112} = \frac{1}{4} = \cdot25$
£6·944 = $\frac{6\cdot944\times20\times12}{28}$ rupees = (·992 × 20 × 3) rupees
= 59·52 rupees.

(4) $\frac{13}{23}$ of the money = 1235*d.*
∴ $\frac{1}{23}$ of the money = $\frac{1235}{13}$*d.* = 95*d.*
∴ the money = (23 × 95)*d.* = 2185*d.* = £9. 2*s.* 1*d.*

(5)
$$\begin{array}{r} £\ \cdot55 \\ 3 \\ \hline £\ 1\cdot65 \\ 20 \\ \hline s.\ 13\cdot00 \end{array} \qquad \begin{array}{r} £\ \cdot34875 \\ 10 \\ \hline £\ 3\cdot4875 \\ 20 \\ \hline s.\ 9\cdot7500 \\ 12 \\ \hline d.\ 9\cdot0000 \end{array} \qquad \begin{array}{r} £\ 5\cdot46875 \\ 3 \\ \hline £\ 16\cdot40625 \\ 20 \\ \hline s.\ 8\cdot12500 \\ 12 \\ \hline d.\ 1\cdot50000 \\ 4 \\ \hline q.\ 2\cdot00000 \end{array}$$

∴ £1. 13*s.* + £3. 9*s.* 9*d.* + £16. 8*s.* 1$\frac{1}{2}$*d.* = £21. 10*s.* 10$\frac{1}{2}$*d.*

(6) $\frac{4}{5}$ of (12 × 20)*s.* − $\frac{5}{6}$ of (3 × 21)*s.* = 192*s.* − 52$\frac{1}{2}$*s.* = 139$\frac{1}{2}$*s.*
$\therefore \frac{139\frac{1}{2}}{5} = \frac{279}{2\times5} = \frac{279}{10}$

(7) $\frac{82\frac{3}{5}}{16\times16} = \frac{413}{5\times16\times16} = \frac{51\cdot625}{10\times16} = \frac{1\cdot290625}{4} = \cdot32265625$

(8) $\frac{\frac{13}{4}}{\frac{21}{5}}$ of 525*s*. $= \frac{13\times5\times525}{4\times21}s. = \frac{13\times5\times25}{4}s.$ = £20. 6*s*. 3*d*.

(9) $\frac{\frac{3}{7}\text{ of }556}{1760\times36} = \frac{139}{7\times1760\times3} = \frac{139}{36960}$

(10) $\frac{1}{4}$ of 17*s* 8*d*. = 53*d*.; 2·625 of 1*s*. = 31·5*d*.;
$\frac{3}{4}$ of $\frac{5}{8}$ of 64*d*. = 30*d*.; $\frac{263-26}{900}$ of 300*d*. = 79*d*.
$\therefore \frac{53+31\cdot5-30+79}{5\times240} = \frac{133\cdot5}{1200} = \cdot11125$

(11) £1. 4*s*. 10¾*d*. = 1195*q*., and £3. 19*s*. 8*d*. = 3824*q*.
$\therefore \frac{1195}{3824} = \cdot3125.$

(12) $\cdot4097\dot{2}$ of 3*s*. $= \frac{40972-4097}{90000}$ of 3*s*. $= \frac{36875\times3}{90000}s.$
$\cdot2\dot{7}$ of 8*s*. $= \frac{27-2}{90}$ of 8*s*. $= \frac{25\times8}{90}s. = \frac{20}{9}s.$
$\therefore \frac{110625+200000}{90000}\times\frac{1}{20} = \frac{310625}{1800000} = \frac{1\cdot553125}{9}$
$= \cdot172569\dot{4}.$

(13) $1\cdot3\dot{2}\dot{7}$ of 308 days $= \frac{1327-13}{990}$ of 308 days $= \frac{1314\times308}{990\times365}$ yr.
$= \frac{28}{25}$ yr.
$1\cdot\dot{2}$ of a year $= \frac{12-1}{9}$ of a year $= \frac{11}{9}$ yr.
$\therefore \left(\frac{11}{9}-\frac{28}{25}\right)\div\frac{1}{2} = \frac{46}{225} = \frac{184}{900} = \cdot20\dot{4}.$

(14) $\cdot42708\dot{3}$ of £1 $= £\frac{427083-42708}{900000} = \frac{384375}{900000} = £\frac{41}{96}.$
$\cdot2\dot{3}4\dot{5}$ of £$6\frac{7}{8}$ $= £\frac{2322\times55}{9900\times8} = £\frac{129}{80}.$
$\therefore \left(\frac{129}{80}-\frac{41}{96}\right)\times\frac{1}{5} = \frac{774-205}{480\times5} = \frac{569}{2400} = \frac{2\cdot845}{12}$
$= \cdot23708\dot{3}.$

(15) $\frac{3}{28}$ of $\frac{7}{8}$ of £1 $= £\frac{3}{32}.$
$\cdot99791\dot{6}$ of £1 $= £\frac{898125}{900000} = £\frac{479}{480}.$
$\therefore \left(\frac{3}{32}+\frac{479}{480}\right)\times\frac{1}{5} = \frac{45+479}{480\times5} = \frac{524}{2400} = \frac{2\cdot62}{12} = \cdot218\dot{3}.$

(16) $\frac{4\times8\times11\times247\times21\times12}{5\times7\times10\times4}d. = \frac{8\times11\times13\times3\times12}{5}d.$ = £34. 6*s*. 4⅘*d*.

(17) $\frac{47\times86427}{9\times99}$*d.* = $\frac{47\times873}{9}$*d.* = £18. 19*s.* 11*d.*

(18) $\frac{1\times101\times17982}{90\times999}$*d.* = $\frac{101\times222}{10\times111}$*d.* = $\frac{101}{5}$*d.* = 1*s.* $8\frac{1}{5}$*d.*

(19) 500 × $(\frac{115}{30} - \frac{280}{84})$lb. = 500 × $\frac{1}{2}$ lb. = 250 lb.

(20) 4 lb. 3 oz. 10 dwt. 20 gr. = 24740 gr.;
6 lb. 5 oz. 6 dwt. 6 gr. = 36110 gr.;
∴ fraction = $\frac{24740}{36110} = \frac{2\times12370}{3\times12370} = \frac{2}{3}$.

(21) Number of oz. = $\frac{113\cdot6975}{3\cdot89375} = 29\cdot2 = 29\frac{1}{5}$.

(22) {·375 × 21)*s.* = 7·875*s.* = 7*s.* $10\frac{1}{2}$*d.*;
$\cdot\dot{5}\dot{4}$ of 99*d.* = $\frac{54}{99}$ × 99*d.* = 54*d.* = 4*s.* 6*d.*;
$\cdot0\dot{2}\dot{7}$ of 55*s.* = $\frac{27}{990}$ × 55*s.* = $\frac{3}{2}$*s.* = 1*s.* 6*d.*;
∴ 7*s.* $10\frac{1}{2}$*d.* + 4*s.* 6*d.* + 1*s.* 6*d.* = 13*s.* $10\frac{1}{2}$*d.*

23) $\frac{5}{18}$ of 21*s.* = $\frac{35}{6}$*s.* = 5*s.* 10*d.*;
$\frac{3}{32}$ of 20*s.* = $\frac{15}{8}$*s.* = 1*s.* $10\frac{1}{2}$*d.*;
$\frac{7}{20}$ of 5*s.* = $\frac{7}{4}$*s.* = 1*s.* 9*d.*;
$\frac{5}{16}$ of 12*d.* = $\frac{15}{4}$*d.* = 0*s.* $3\frac{3}{4}$*d.*
} ∴ sum = 9*s.* $9\frac{1}{4}$*d.*
∴ decimal = $\frac{469}{960} = \frac{46\cdot9}{96} = \frac{5\cdot8625}{12} = \cdot488541\dot{6}$.

(24) $\frac{5\times1\times77}{7\times4}$*d.* = $\frac{55}{4}$*d.* = 1*s.* $1\frac{3}{4}$*d.*
$\frac{1\times2\times30}{6\times5}$*d.* = 2*d.*
} ∴ sum = 1*s.* $3\frac{3}{4}$*d.*
∴ decimal = $\frac{63}{960} = \frac{6\cdot3}{96} = \frac{\cdot7875}{12} = \cdot065625$.

(25) $\frac{3\times375\times10}{16\times1000}$*s.* = $\frac{3\times15}{16\times4}$*s.* = $\frac{45}{64}$*s.*;
∴ $(\frac{45}{64} + 2 - \frac{3}{4}) \times \frac{1}{20} = \frac{125}{64\times20} = \frac{6\cdot25}{64} = \cdot09765625$.

(26) $\frac{4\times21}{9}s. = \frac{28}{3}s.$; $\frac{3\times1\times20}{8\times2}s. = \frac{15}{4}s.$;
$\frac{1\times3\times5}{12\times4}s. = \frac{5}{16}s.$; $\frac{1}{6}$ of $\frac{13}{18}$ of 1$s.$ = $\frac{13}{108}s.$;
$\therefore (\frac{28}{3} + \frac{15}{4} - \frac{5}{16} - \frac{13}{108}) \times \frac{1}{20} = \frac{5652-187}{16\times27\times20}$
$= \frac{5465}{16\times27\times20} = \frac{273\cdot25}{16\times27} = \frac{17\cdot078125}{27} = \cdot632523\dot{1}4\dot{8}.$

(27) $(\frac{11\times21}{12} - \frac{63}{3\times4}) \times \frac{1}{100\times20} = \frac{45}{4\times100\times20} = \frac{9}{1000}.$

(28) $\frac{2\times21}{9}s. = \frac{14}{3}s.$; $\frac{3\times20}{8}s. = \frac{15}{2}s.$;
$\therefore (\frac{14}{3} + \frac{15}{2} + \frac{5}{8} - \frac{47}{4}) \times \frac{1}{25} = \frac{307-282}{24} \times \frac{1}{25}$
$= \frac{25}{24\times25} = \frac{1}{24}.$

Ex. (xc), p. 154.

(1) £72. 6 f. = 72600 m. (2) £6. 4 f. 5 c. 6 m. = 6456 m.

(3) £45. 3 f. 2 c. 5 m. = 45325 m. (4) £7. 3 c. = 7030 m.

(5) £18. 4 m. = 18004 m. (6) £19. 3 c. 5 m. = 19035 m.

(7)
m.
64842
32032
14000
15200

126074 = £126. 0 f. 7 c. 4 m.

(8)
m.
374350
432345
523
16004

823222 = £823. 2 f. 2 c. 2 m.

(9)

£	f.	c.	m.
17	3	4	5
15	5	9	8
1	7	4	7

(10)
m.
15004
14999

5

(11)

$$\begin{array}{r} \overset{\text{m.}}{16738} \\ 43 \\ \hline 50214 \\ 66952 \\ \hline 719734 \end{array} = £719.\ 7\text{ f. } 3\text{ c. } 4\text{ m.}$$

(12)

$$\begin{array}{r} \overset{\text{m.}}{143034} \\ 73 \\ \hline 429102 \\ 1001238 \\ \hline 10441482 \end{array} = £10441.\ 4\text{ f. } 8\text{ c. } 2\text{ m.}$$

(14)

$$\begin{array}{r} 189\,)\,\overset{\text{m.}}{1674918}\,(\,\overset{\text{m.}}{8862} = £8.\ 8\text{ f. } 6\text{ c. } 2\text{ m.} \\ 1512 \\ \hline 1629 \\ 1512 \\ \hline 1171 \\ 1134 \\ \hline 378 \\ 378 \\ \hline \end{array}$$

(13)

$$\begin{array}{r|l} 5 & \overset{\text{m.}}{175425} \\ \hline 3 & 35085 \\ \hline \end{array}$$

$$11695 = £11.\ 6\text{ f. } 9\text{ c. } 5\text{ m.}$$

Ex. (xci), p. 156.

(1) 10*s.* = £·5 = 5 f. (2) 5*s.* = £·25 = 25 c.

(3) 2*s.* 6*d.* = £$\frac{1}{8}$ = £·125 = 125 m.

(4) 1*s.* = £$\frac{1}{20}$ = £·05 = 5 c.

(5) 6*d.* = £$\frac{1}{40}$ = £·025 = 25 m.

(6) 1*d.* = £$\frac{1}{240}$ = $\frac{1000}{240}$ m. = 4$\frac{1}{6}$ m.

(7) 68*s.* = $\frac{68}{2}$ f. = 34 f. (8) 93*s.* = $\frac{93}{2}$ f. = 465 c.

(9)
$$\begin{array}{r|l} 20 & 14\cdot5 \\ \hline & \pounds\ 7\cdot725 \end{array}$$

(10)
$$\begin{array}{r|l} 12 & 3\cdot5 \\ \hline 20 & 15\cdot291\dot{6} \\ \hline & \pounds\ 13\cdot76458\dot{3} \end{array}$$

(11)
$$\begin{array}{r|l} 12 & 5\cdot0 \\ \hline 20 & \cdot41\dot{6} \\ \hline & \pounds\ 42\cdot0208\dot{3} \end{array}$$

(12)
$$\begin{array}{r|l} 12 & 1\cdot5 \\ \hline 20 & 3\cdot125 \\ \hline & \pounds\ 54\cdot15625 \end{array}$$

(13) 1 c. $= \frac{24}{10}d. = 2\frac{2}{5}d.$

(14) 1 m. $= \frac{24}{100}d. = \frac{24}{25}q.$

(15) £14·5 = £14. 10*s.*

(16) £3·45 = £3. 9*s.*

(17)
$$\begin{array}{r} \pounds 7\cdot864 \\ 20 \\ \hline s.\ 17\cdot280 \\ 12 \\ \hline d.\ 3\cdot360 \end{array}$$

(18)
$$\begin{array}{r} \pounds 423\cdot4 \\ 20 \\ \hline s.\ 8\cdot0 \end{array}$$

(19)
$$\begin{array}{r} \pounds 437\cdot25 \\ 20 \\ \hline s.\ 5\cdot00 \end{array}$$

(20)
$$\begin{array}{r} \pounds\cdot467325 \\ 20 \\ \hline s.\ 9\cdot346500 \\ 12 \\ \hline d.\ 4\cdot158000 \end{array}$$

(21)
$$\begin{array}{r} \pounds 5\cdot4325 \\ 20 \\ \hline s.\ 8\cdot6500 \\ 12 \\ \hline d.\ 7\cdot8000 \end{array}$$

(22)
$$\begin{array}{r} \pounds 7\cdot423425 \\ 20 \\ \hline s.\ 8\cdot468500 \\ 12 \\ \hline d.\ 5\cdot622000 \end{array}$$

Ex. (xcii), p. 159.

		s.	d.	
(1)	6*d.* is ½ of 1*s.*	6325	0	= cost at 1*s.* each.
	3*d.* is ½ of 6*d.*	3162	6	= .. .. .. 6*d.* .. ..
	¼*d.* is $\frac{1}{12}$ of 3*d.*	1581	3	= .. .. .. 3*d.* .. ..
		131	9¼	= .. .. .. ¼*d.* .. ..
	20	4875	6¼	= .. .. .. 9¾*d.* .. ..

£243. 15*s.* 6¼*d.*

		s.	d.	
(2)	6*d.* is ½ of 1*s.*	3254	0	= cost at 1*s.* each.
	4*d.* is ⅓ of 1*s.*	1627	0	= .. .. .. 6*d.* .. ..
	½*d.* is ⅛ of 4*d.*	1084	8	= .. .. .. 4*d.* .. ..
		135	7	= .. .. .. ½*d.* .. ..
	20	2847	3	= .. .. .. 10½*d.* .. ..

£142. 7*s.* 3*d.*

		s.	d.	
(3)	3*d.* is ¼ of 1*s.*	5271	0	= cost at 1*s.* each.
	½*d.* is ⅙ of 3*d.*	1317	9	= .. .. .. 3*d.* .. ..
		219	7½	= .. .. .. ½*d.* .. ..
	20	6808	4½	= .. .. .. 1*s.* 3½*d.* each.

£340. 8*s.* 4½*d.*

		s.	d.	
(4)	6*d.* is ½ of 1*s.*	1007	0	= cost at 1*s.* each.
	4*d.* is ⅓ of 1*s.*	503	6	= .. .. .. 6*d.* .. ..
	½*d.* is ⅛ of 4*d.*	335	8	= .. .. .. 4*d.* .. ..
	¼*d.* is ½ of ½*d.*	41	11½	= .. .. .. ½*d.* .. ..
		20	11¾	= .. .. .. ¼*d.* .. ..
	20	1909	1¼	= .. .. .. 1*s.* 10¾*d.* each.

£95. 9*s.* 1¼*d.*

		s.	*d.*	
(5)	6*d.* is $\frac{1}{2}$ of 1*s.*	7104 .	6	= cost at 1*s.* each.
	2*d.* is $\frac{1}{3}$ of 6*d.*	3552 .	3	= .. .. .. 6*d.* .. ..
	$\frac{1}{2}$*d.* is $\frac{1}{4}$ of 2*d.*	1184 .	1	= .. .. .. 2*d.* .. ..
		296 .	0$\frac{1}{4}$	= .. .. .. $\frac{1}{2}$*d.* .. ..
	20	12136 .	10$\frac{1}{4}$	= .. .. .. 1*s.* 8$\frac{1}{2}$*d.* each.
		£606. 16*s.* 10$\frac{1}{4}$*d.*		

		s.	*d.*	
(6)		4000 .	0	= cost at 1*s.* each.
			2	
	$\frac{1}{4}$*d.* = $\frac{1}{48}$ of 1*s.*	8000 .	0	= .. .. .. 2*s.* .. ..
		83 .	4	= .. .. .. $\frac{1}{4}$*d.* .. ..
	20	7916 .	8	= .. .. .. 1*s.* 11$\frac{3}{4}$*d.* each.
		£395. 16*s.* 8*d.*		

		s.	*d.*	
(7)		2510 .	0	= cost at 1*s.* each.
			7	
		17570 .	0	
			2	
	6*d.* is $\frac{1}{2}$ of 1*s.*	35140 .	0	= cost at 14*s.* each.
	1*d.* is $\frac{1}{6}$ of 6*d.*	1255 .	0	= .. .. .. 6*d.* .. ..
	$\frac{1}{4}$*d.* is $\frac{1}{4}$ of 1*d.*	209 .	2	= .. .. .. 1*d.* .. ..
		52 .	3$\frac{1}{2}$	= .. .. .. $\frac{1}{4}$*d.* .. ..
	20	36656 .	5$\frac{1}{2}$	= .. .. .. 14*s.* 7$\frac{1}{4}$*d.* each.
		£1832. 16*s.* 5$\frac{1}{2}$*d.*		

		s.	*d.*	
(8)		7251 .	0	= cost at 1*s.* each.
			2	
		14502 .	0	
			7	
	6*d.* is $\frac{1}{2}$ of 1*s.*	101514 .	0	= cost at 14*s.* each.
	2*d.* is $\frac{1}{3}$ of 6*d.*	3625 .	6	= .. .. .. 6*d.* .. ..
	$\frac{1}{4}$*d.* is $\frac{1}{8}$ of 2*d.*	1208 .	6	= .. .. .. 2*d.* .. ..
		151 .	0$\frac{3}{4}$	= .. .. .. $\frac{1}{4}$*d.* .. ..
	20	106499 .	0$\frac{3}{4}$	= .. .. .. 14*s.* 8$\frac{1}{4}$*d.* each.
		£5324. 19*s.* 0$\frac{3}{4}$*d.*		

(9)

	£	s.	d.	
	2154	5	0	= cost at £1 each.
			7	
1*s.* is $\frac{1}{20}$ of £1	15079	15	0	= ...... £7 ....
3*d.* is $\frac{1}{4}$ of 1*s.*	107	14	3	= ...... 1*s.* ....
	26	18	6¾	= ...... 3*d.* ....
	£15214	7	9¾	= cost at £7. 1*s.* 3*d.* each.

(10)

	£	s.	d.	
	3684	0	0	= cost at £1 each.
			2	
5*s.* is $\frac{1}{4}$ of £1	7368	0	0	= ...... £2 ....
1*s.* is $\frac{1}{5}$ of 5*s.*	921	0	0	= ...... 5*s.* ....
6*d.* is $\frac{1}{2}$ of 1*s.*	184	4	0	= ...... 1*s.* ....
3*d.* is $\frac{1}{2}$ of 6*d.*	92	2	0	= ...... 6*d.* ....
$\frac{1}{4}$*d.* is $\frac{1}{12}$ of 3*d.*	46	1	0	= ...... 3*d.* ....
	3	16	9	= ...... $\frac{1}{4}$*d.* ....
	£8615	3	9	= cost at £2. 6*s.* 9$\frac{1}{4}$*d.* each.

(11)

	£	s.	d.	
10*s.* is $\frac{1}{2}$ of £1	2017	15	0	= cost at £1 each.
2*s.* is $\frac{1}{5}$ of 10*s.*	1008	17	6	= ...... 10*s.* ....
1*s.* is $\frac{1}{2}$ of 2*s.*	201	15	6	= ...... 2*s.* ....
	100	17	9	= ...... 1*s.* ....
	£3329	5	9	= cost at £1. 13*s.* each.

(12)

	£	s.	d.	
5*s.* is $\frac{1}{4}$ of £1	3142	0	0	=cost at £1. each.
2*s.* 6*d.* is $\frac{1}{2}$ of 5*s.*	785	10	0	= ...... 5*s.* ....
3*d.* is $\frac{1}{10}$ of 2*s.* 6*d.*	392	15	0	= ...... 2*s.* 6*d.* ....
1*d.* is $\frac{1}{3}$ of 3*d.*	39	5	6	= ...... 3*d.* ....
$\frac{1}{4}$*d.* is $\frac{1}{4}$ of 1*d.*	13	1	10	= ...... 1*d.* ....
	3	5	5½	= ...... $\frac{1}{4}$*d.* ....
	£4375	17	9½	=cost at £1. 7*s.* 10$\frac{1}{4}$*d.* each.

(13)

	£	s.	d.	
10s. is $\frac{1}{2}$ of £1	3210	0	0	=cost at £1 each.
5s. is $\frac{1}{2}$ of 10s.	1605	0	0	= ...... 10s. ....
2s. 6d. is $\frac{1}{2}$ of 5s.	802	10	0	= ...... 5s. ....
1s. is $\frac{1}{5}$ of 5s.	401	5	0	= ...... 2s. 6d. ....
$\frac{3}{4}$d. is $\frac{1}{16}$ of 1s.	160	10	0	= ...... 1s. ....
	10	0	$7\frac{1}{2}$	= ...... $\frac{3}{4}$d. ....
	£6189	5	$7\frac{1}{2}$	=cost at £1. 18s. $6\frac{3}{4}$d. each.

(14)

	£	s.	d.	
10s. is $\frac{1}{2}$ of £1	4321	0	0	=cost at £1 each.
5s. is $\frac{1}{2}$ of 10s.	2160	10	0	= ...... 10s. ....
2s. is $\frac{1}{5}$ of 10s.	1080	5	0	= ...... 5s. ....
3d. is $\frac{1}{8}$ of 2s.	432	2	0	= ...... 2s. ....
$\frac{3}{4}$d. is $\frac{1}{4}$ of 3d.	54	0	3	= ...... 3d. ....
	13	10	$0\frac{3}{4}$	= ...... $\frac{3}{4}$d. ....
	£8061	7	$3\frac{3}{4}$	= ...... £1. 17s. $3\frac{3}{4}$d. each.

(15)

	£	s.	d.	
	2175	0	0	=cost at £1 each.
			2	
10s. is $\frac{1}{2}$ of £1	4350	0	0	= ...... £2 ....
5s. is $\frac{1}{2}$ of 10s.	1087	10	0	= ...... 10s. ....
3d. is $\frac{1}{20}$ of 5s.	543	15	0	= ...... 5s. ....
$1\frac{1}{2}$d. is $\frac{1}{2}$ of 3d.	27	3	9	= ...... 3d. ....
	13	11	$10\frac{1}{2}$	= ...... $\frac{1}{2}$d. ....
	£6022	0	$7\frac{1}{2}$	=cost at £2. 15s. $4\frac{1}{2}$d. each.

(16)

	£	s.	d.	
5s. is $\frac{1}{4}$ of £1	3768	10	0	=cost at £1 each.
2s. is $\frac{1}{10}$ of £1	942	2	6	= ...... 5s. ....
4d. is $\frac{1}{6}$ of 2s.	376	17	0	= ...... 2s. ....
$\frac{1}{2}$d. is $\frac{1}{8}$ of 4d.	62	16	2	= ...... 4d. ....
	7	17	$0\frac{1}{4}$	= ...... $\frac{1}{2}$d. ....
	£5158	2	$8\frac{1}{4}$	=cost at £1. 7s. $4\frac{1}{2}$d. each.

(17)

	£	s.	d.	
	4276	0	0	= cost at £1 each.
			12	
10s. is ½ of £1	51312	0	0	= ...... £12 ....
1s. is 1/10 of 10s.	2138	0	0	= ...... 10s. ....
4d. is ⅓ of 1s.	213	16	0	= ...... 1s. ....
1d. is ¼ of 4d.	71	5	4	= ...... 4d. ....
½d. is ½ of 1d.	17	16	4	= ...... 1d. ....
	8	18	2	= ...... ½d. ....
	£53761	15	10	= cost at £12.11s.5½d. each.

(18)

	£	s.	d.	
	5783	0	0	= cost at £1 each.
			2	
	11566	0	0	
			7	
5s. is ¼ of £1	80962	0	0	= cost at £14 each.
4s. is ⅕ of £1	1445	15	0	= ...... 5s. ....
6d. is ⅛ of 4s.	1156	12	0	= ...... 4s. ....
½d. is 1/12 of 6d.	144	11	6	= ...... 6d. ....
	12	0	11½	= ...... ½d. ....
	£83720	19	5½	= cost at £14. 9s. 6½d. each.

(19)

	£	s.	d.	
	3689	13	4	= cost at £1 each.
			2	
	7379	6	8	
			8	
10s. is ½ of £1	59034	13	4	= cost at £16 each.
2s.6d. is ¼ of 10s.	1844	16	8	= ...... 10s. ....
3d. is 1/10 of 2s.6d.	461	4	2	= ...... 2s. 6d. ..
	46	2	5	= ...... 3d. ....
	£61386	16	7	= cost at £16. 12s. 9d. each.

(20)

	£	*s.*	*d.*	
	7483	0	0	= cost at £1 each.
			2	
	14996	0	0	
			11	
10*s.* is $\frac{1}{2}$ of £1	164626	0	0	= cost at £22 each.
2*s.* is $\frac{1}{5}$ of 10*s.*	3741	10	0	= .. .. .. 10*s.* .. ..
1*s.* is $\frac{1}{2}$ of 2*s.*	748	6	0	= .. .. .. 2*s.* .. ..
2*d.* is $\frac{1}{6}$ of 1*s.*	374	3	0	= .. .. .. 1*s.* .. ..
$\frac{1}{2}$*d.* is $\frac{1}{4}$ of 2*d.*	62	7	2	= .. .. .. 2*d.* .. ..
	15	11	$9\frac{1}{2}$	= .. .. .. $\frac{1}{2}$*d.* .. ..
	£169567	17	$11\frac{1}{2}$	= cost at £22. 13*s.* $2\frac{1}{2}$*d.* each.

(21)

	£	*s.*	*d.*	
5*s.* is $\frac{1}{4}$ of £1.	4234	10	0	= dividend at £1. in the £.
6*d.* is $\frac{1}{10}$ of 5*s.*	1058	12	6	= .. .. 5*s.* .. .. ..
	105	17	3	= .. .. 6*d.* .. .. ..
	£1164	9	9	= dividend at 5*s.* 6*d.* in the £.

(22)

	£	*s.*	*d.*	
2*s.* is $\frac{1}{10}$ of £1.	4975	0	0	= dividend at £1. in the £.
1*s.* is $\frac{1}{2}$ of 2*s.*	497	10	0	= .. .. 2*s.* .. .. ..
4*d.* is $\frac{1}{3}$ of 1*s.*	248	15	0	= .. .. 1*s.* .. .. ..
$\frac{1}{2}$*d.* is $\frac{1}{8}$ of 4*d.*	82	18	4	= .. .. 4*d.* .. .. ..
	10	7	$3\frac{1}{2}$	= .. .. $\frac{1}{2}$*d.* .. .. ..
	£839	10	$7\frac{1}{2}$	= dividend at 3*s.* $4\frac{1}{2}$*d.* in the £

(23)

	£	*s.*	*d.*	
5*s.* is $\frac{1}{4}$ of £1.	3729	18	6	= div. at £1. in the £.
2*s.* 6*d.* is $\frac{1}{2}$ of 5*s.*	932	9	$7\frac{1}{2}$	= .. .. .. 5*s.* .. ..
3*d.* is $\frac{1}{10}$ of 2*s.* 6*d.*	466	4	$9\frac{3}{4}$	= .. .. .. 2*s.* 6*d.* .. ..
$\frac{3}{4}$*d.* is $\frac{1}{4}$ of 3*d.*	46	12	$5\frac{31}{40}$	= .. .. .. 3*d.* .. ..
	11	13	$1\frac{71}{160}$	= .. .. .. $\frac{3}{4}$*d.* .. ..
	£1457	0	$0\frac{15}{32}$	= div. at 7*s.* $9\frac{3}{4}$*d.* in £.

Ex. (xciii), p. 161.

		£	s.	d.	
(1)		3	17	6	= cost of 1 cwt.
				5	
		19	7	6	
				5	
	2 qr. is $\frac{1}{2}$ of 1 cwt.	96	17	6	= cost of 25 cwt.
	14 lb. is $\frac{1}{4}$ of 2 qr.	1	18	9	= .. .. .. 2 qr.
			9	$8\frac{1}{4}$	= .. .. .. 14 lb.
		£99	5	$11\frac{1}{4}$	= cost of 25 cwt. 2 qr. 14 lb.

		£	s.	d.	
(2)		4	5	8	= cost of 1 cwt.
				9	
		38	11	0	
				8	
	1 qr. is $\frac{1}{4}$ of 1 cwt.	308	8	0	= cost of 72 cwt.
	14 lb. is $\frac{1}{2}$ of 1 qr.	1	1	5	= .. .. .. 1 qr.
	4 lb. is $\frac{1}{7}$ of 1 qr.		10	$8\frac{1}{2}$	= .. .. .. 14 lb.
			3	$0\frac{5}{7}$	= .. .. .. 4 lb.
		£310	3	$2\frac{3}{14}$	= cost of 72 cwt. 1 qr. 18 lb.

		£	s.	d.	
(3)		2	17	9	= cost of 1 cwt.
				12	
		34	13	0	
				6	
		207	18	0	= cost of 72 cwt.
	2 qr. is $\frac{1}{2}$ of 1 cwt.	17	6	6	= .. .. .. 6 cwt.
	1 qr. is $\frac{1}{2}$ of 2 qr.	1	8	$10\frac{1}{2}$	= .. .. .. 2 qr.
	7 lb. is $\frac{1}{4}$ of 1 qr.		14	$5\frac{1}{4}$	= .. .. .. 1 qr.
	4 lb. is $\frac{1}{7}$ of 1 qr.		3	$7\frac{5}{16}$	= .. .. .. 7 lb.
	1 lb. is $\frac{1}{4}$ of 4 lb.		2	$0\frac{3}{4}$	= .. .. .. 4 lb.
				$6\frac{3}{16}$	= .. .. .. 1 lb.
		£227	14	0	= cost of 78 cwt. 3 qr. 12 lb.

(4)

	£	s.	d.	
	3	17	10	= cost of 1 cwt.
			4	
	15	11	4	
			9	
	140	2	0	= cost of 36 cwt.
2 qr. is $\frac{1}{2}$ of 1 cwt.	3	17	10	= .. .. .. 1 cwt.
7 lb. is $\frac{1}{8}$ of 2 qr.	1	18	11	= .. .. .. 2 qr.
4 lb. is $\frac{1}{14}$ of 2 qr.		4	$10\frac{3}{8}$	= .. .. .. 7 lb.
2 lb. is $\frac{1}{2}$ of 4 lb.		2	$9\frac{5}{14}$	= .. .. .. 4 lb.
		1	$4\frac{19}{28}$	= .. .. .. 2 lb.
	£146	7	$9\frac{23}{56}$	= cost of 37 cwt. 2 qr. 13 lb.

(5)

	£	s.	d.	
	3	11	6	= cost of 1 cwt.
			10	
	35	15	0	
			5	
	178	15	0	= cost of 50 cwt.
14 lb. is $\frac{1}{8}$ of 1 cwt.	10	14	6	= .. .. .. 3 cwt.
2 lb. is $\frac{1}{7}$ of 14 lb.		8	$11\frac{1}{4}$	= .. .. .. 14 lb.
1 lb. is $\frac{1}{2}$ of 2 lb.		1	$3\frac{9}{28}$	= .. .. .. 2 lb.
			$7\frac{37}{56}$	= .. .. .. 1 lb.
	£190	0	$4\frac{13}{56}$	= cost of 53 cwt. 0 qr 17 lb.

(6)

	£	s.	d.	
	32	0	0	= cost of 1 ton.
			2	
5 cwt. is $\frac{1}{4}$ of 1 ton.	64	0	0	= cost of 2 tons.
2 cwt. is $\frac{1}{10}$ of 1 ton.	8	0	0	= .. .. .. 5 cwt.
2 qr. is $\frac{1}{4}$ of 2 cwt.	3	4	0	= .. .. .. 2 cwt.
4 lb. is $\frac{1}{14}$ of 2 qr.		16	0	= .. .. .. 2 qr.
1 lb. is $\frac{1}{4}$ of 4 lb.		1	$1\frac{5}{7}$	= .. .. .. 4 lb.
			$3\frac{3}{7}$	= .. .. .. 1 lb.
	£76	1	$5\frac{1}{7}$	= cost of 2 tons 7 cwt. 2 qr. 5 lb.

	£	s.	d.	
(7)	25	7	4	= cost of 1 cwt.
			8	
	202	18	8	
			2	
	405	17	4	= cost of 16 cwt.
1 qr. is $\frac{1}{4}$ of 1 cwt.	25	7	4	= .. .. .. 1 cwt.
7 lb. is $\frac{1}{4}$ of 1 qr.	6	6	10	= .. .. .. 1 qr.
4 lb. is $\frac{1}{7}$ of 1 qr.	1	11	$8\frac{1}{2}$	= .. .. .. 7 lb.
		18	$1\frac{3}{7}$	= .. .. .. 4 lb.
	£440	1	$3\frac{13}{14}$	= cost of 17 cwt. 1 qr. 11 lb.

	£	s.	d.	
(8)	7	3	4	= cost of 1 ton.
			5	
2 qr. is $\frac{1}{40}$ of 1 ton.	35	16	8	= cost of 5 tons.
1 qr. is $\frac{1}{2}$ of 2 qr.		3	7	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.		1	$9\frac{1}{2}$	= .. .. .. 1 qr.
2 lb. is $\frac{1}{7}$ of 14 lb.			$10\frac{3}{4}$	= .. .. .. 14 lb.
1 lb. is $\frac{1}{2}$ of 2 lb.			$1\frac{1}{2}\frac{5}{8}$	= .. .. .. 2 lb.
			$\frac{43}{56}$	= .. .. .. 1 lb.
	£ 36	3	$1\frac{31}{56}$	= cost of 5 tons 3 qr. 17 lb.

	£	s.	d.	
(9)	5	6	8	= cost of 1 ton.
			8	
2 cwt. is $\frac{1}{10}$ of 1 ton.	42	13	4	= cost of 8 tons.
1 cwt. is $\frac{1}{2}$ of 2 cwt.		10	8	= .. .. .. 2 cwt.
14 lb. is $\frac{1}{8}$ of 1 cwt.		5	4	= .. .. .. 1 cwt.
7 lb. is $\frac{1}{2}$ of 14 lb.			8	= .. .. .. 14 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			4	= .. .. .. 7 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			$1\frac{1}{7}$	= .. .. .. 2 lb.
2 lb. is $\frac{1}{7}$ of 14 lb.			$1\frac{1}{7}$	= .. .. .. 2 lb.
			$1\frac{1}{7}$	= .. .. .. 2 lb.
	£43	10	$7\frac{3}{7}$	= cost of 8 tons 3 cwt. 27 lb.

(10)	£	s.	d.	
	4	2	6	= cost of 1 lb.
			3	
4 oz. is $\frac{1}{3}$ of 1 lb.	12	7	6	= cost of 3 lb.
5 dwt. is $\frac{1}{16}$ of 4 oz.	1	7	6	= .. .. .. 4 oz.
1 dwt. is $\frac{1}{5}$ of 5 dwt.		1	$8\frac{5}{8}$	= .. .. .. 5 dwt.
1 dwt. is $\frac{1}{5}$ of 5 dwt.			$4\frac{1}{8}$	= .. .. .. 1 dwt.
			$4\frac{1}{8}$	= .. .. .. 1 dwt.
	£13	17	$4\frac{7}{8}$	= cost of 3 lb. 4 oz. 7 dwt.

(11)	£	s.	d.	
	10	0	0	= cost of 1 rood.
			23	
4 po. is $\frac{1}{10}$ of 1 ro.	230	0	0	= cost of 5 ac. 3 ro.
$4\frac{1}{2}$ yd. is $\frac{9}{242}$ of 4 po.	1	0	0	= .. .. .. 4 po.
			$8\frac{112}{121}$	= .. .. .. $4\frac{1}{2}$ yd.
	£231	0	$8\frac{112}{121}$	= cost of 5 ac. 3 ro. 4 po. $4\frac{1}{2}$ yd.

(12)	£	s.	d.	
	3	18	2	= cost of 1 cwt.
			12	
2 qr. is $\frac{1}{2}$ of 1 cwt.	46	18	0	= cost of 12 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	1	19	1	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.		19	$6\frac{1}{2}$	= .. .. .. 1 qr.
7 lb. is $\frac{1}{2}$ of 14 lb.		9	$9\frac{1}{4}$	= .. .. .. 14 lb.
1 lb. is $\frac{1}{7}$ of 7 lb.		4	$10\frac{5}{8}$	= .. .. .. 7 lb.
8 oz. is $\frac{1}{2}$ of 1 lb.			$8\frac{3}{8}$	= .. .. .. 1 lb.
4 oz. is $\frac{1}{2}$ of 8 oz.			$4\frac{3}{16}$	= .. .. .. 8 oz.
			$2\frac{3}{32}$	= .. .. .. 4 oz.
	£50	12	$6\frac{1}{32}$	= cost of 12 cwt. 3 qr. 22 lb. 12 oz.

(13)

	£	s.	d.	
	2	18	$10\frac{2}{3}$	= cost of 1 acre.
			10	
2 ro. is $\frac{1}{2}$ of 1 ac.	29	8	$10\frac{2}{3}$	= cost of 10 acres.
1 ro. is $\frac{1}{2}$ of 2 ro.	1	9	$5\frac{1}{3}$	= .. .. .. 2 ro.
20 po. is $\frac{1}{2}$ of 1 ro.		14	$8\frac{2}{3}$	= .. .. .. 1 ro.
5 po. is $\frac{1}{4}$ of 20 po.		7	$4\frac{1}{3}$	= .. .. .. 20 po.
1 po. is $\frac{1}{5}$ of 5 po.		1	$10\frac{1}{12}$	= .. .. .. 5 po.
			$4\frac{5}{12}$	= .. .. .. 1 po.
	£32	2	$7\frac{1}{2}$	= cost of 10 ac. 3 ro. 26 po.

(14)

	£	s.	d.	
	3	14	$8\frac{1}{4}$	= cost of 1 cwt.
			12	
	44	16	3	
			11	
2 qr. is $\frac{1}{2}$ of 1 cwt.	492	18	9	= cost of 6 tons 12 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	1	17	$4\frac{1}{8}$	= .. .. .. 2 qr.
7 lb. is $\frac{1}{4}$ of 1 qr.		18	$8\frac{1}{16}$	= .. .. .. 1 qr.
$3\frac{1}{2}$ lb. is $\frac{1}{2}$ of 7 lb.		4	$8\frac{1}{64}$	= .. .. .. 7 lb.
		2	$4\frac{1}{128}$	= .. .. .. $3\frac{1}{2}$ lb.
	£496	1	$9\frac{27}{128}$	= cost of 6 tons 12 cwt. 3 qr. $10\frac{1}{2}$ lb.

(15)

	£	s.	d.	
	12	12	0	= cost of 1 cwt.
			9	
	113	8	0	
			7	
2 qr. is $\frac{1}{2}$ of 1 cwt.	793	16	0	= cost of 63 cwt.
1 qr. is $\frac{1}{2}$ of 2 qr.	6	6	0	= .. .. .. 2 qr.
14 lb. is $\frac{1}{2}$ of 1 qr.	3	3	0	= .. .. .. 1 qr.
$3\frac{1}{2}$ lb. is $\frac{1}{4}$ of 14 lb.	1	11	6	= .. .. .. 14 lb.
		7	$10\frac{1}{2}$	= .. .. .. $3\frac{1}{2}$ lb.
	£805	4	$4\frac{1}{2}$	= cost of 63 cwt. 3 qr. $17\frac{1}{2}$ lb.

(16)

	£	s.	d.	
	105	0	0	= cost of 1 acre.
			7	
	735	0	0	
			4	
	2940	0	0	= cost of 28 acres.
2 ro. is ½ of 1 ac.	105	0	0	= ...... 1 acre.
1 ro. is ½ of 2 ro.	52	10	0	= ...... 2 ro.
5 po. is ⅛ of 1 ro.	26	5	0	= ...... 1 ro.
	3	5	7½	= ...... 5 po.
	£3127	0	7½	= cost of 29 acres 3 ro. 5 po.

(17)

	£	s.	d.	
	3	17	6	= cost of 1 oz.
			4	
	15	10	0	
			4	
5 dwt. is ¼ of 1 oz.	62	0	0	= cost of 16 oz.
1 dwt. is ⅕ of 5 dwt.		19	4½	= ...... 5 dwt.
20 gr. is ⅙ of 5 dwt.		3	10½	= ...... 1 dwt.
		3	2¾	= ...... 20 gr.
	£63	6	5¾	= cost of 16 oz. 6 dwt. 20 gr.

(18)

	£	s.	d.	
	42	2	4	= cost of 1 acre.
			5	
	210	11	8	
			5	
1 ro. is ¼ of 1 ac.	1052	18	4	= cost of 25 acres.
10 po. is ¼ of 1 ro.	10	10	7	= ...... 1 ro.
	2	12	7¾	= ...... 10 po.
	£1066	1	6¾	= cost of 25 ac. 1 ro. 10 po.

	£	s.	d.	
(19)	22	8	0	= cost of 1 cwt.
			13	
2 qr. is ½ of 1 cwt.	291	4	0	= cost of 13 cwt.
1 qr. is ½ of 2 qr.	11	4	0	= .. .. .. 2 qr.
14 lb. is ½ of 1 qr.	5	12	0	= .. .. .. 1 qr.
2 lb. is ⅐ of 14 lb.	2	16	0	= .. .. .. 14 lb.
1 lb. is ½ of 2 lb.		8	0	= .. .. .. 2 lb.
		4	0	= .. .. .. 1 lb.
	£311	8	0	= cost of 13 cwt. 3 qr. 17 lb.

	£	s.	d.	
(20)	2	12	6	= cost of 1 cwt.
			10	
	26	5	0	
			30	
	787	10	0	= cost of 300 cwt.
	26	5	0	= .. .. .. 10 cwt.
2 qr. is ½ of 1 cwt.	23	12	6	= .. .. .. 9 cwt.
1 qr. is ½ of 2 qr.	1	6	3	= .. .. .. 2 qr.
14 lb. is ½ of 1 qr.		13	1½	= .. .. .. 1 qr.
2 lb. is ⅐ of 14 lb.		6	6¾	= .. .. .. 14 lb.
			11¼	= .. .. .. 2 lb.
	£839	14	4½	= cost of 319 cwt. 3 qr. 16 lb.

Ex. (xciv), p. 163.

		£	s.	d.
(1)	10¼ × 11*d.* =	0	9	4¾
	7¾ × 8*d.* =	0	5	2
	2½ × 1*s.* =	0	2	6
	5¾ × 9*d.* =	0	4	3¾
	1½ × 11*d.* =	0	1	4½
	3¼ × 1*s.* =	0	3	3
		£1	6	0

		£	s.	d.
(2)	5 × 2*s.* 8*d.* =	0	13	4
	2¼ × 4*s.* 6*d.* =	0	10	1½
	15½ × 5½*d.* =	0	7	1¼
	17 × 4*d.* =	0	5	8
	7½ × 11*d.* =	0	6	10½
	4 × 6½*d.* =	0	2	2
		£2	5	3¼

		£	s.	d.
(3)	15½ × 2s. 3d. =	1	14	10½
	29 × 8½d. =	1	0	6½
	25 × 2s. 4d. =	2	18	4
	17 × 1s. 2d. =	0	19	10
	12½ × 11½d. =	0	11	11¾
	3½ × 9s. 10d. =	1	14	5
		£8	19	11¾

		£	s.	d.
(4)	23 × 7s. 8d. =	8	16	4
	17 × 10½d. =	0	14	10½
	13½ × 9½d. =	0	10	8¼
	18 × 2s. 9d. =	2	9	6
	5 × 3s. 3d. =	0	16	3
	18 × 6½d. =	0	9	9
		£13	17	4¾

		£	s.	d.
(5)	5 × £1. 4s. =	6	0	0
	12½ × 2s. 11d. =	1	16	5½
	15¾ × 9s. 6d. =	7	9	7½
	5½ × 1s. 9d. =	0	9	7½
	2 × £1. 3s. 9d. =	2	7	6
	25¼ × 9d. =	0	18	11¼
		£19	2	1¾

		£	s.	d.
(6)	39½ × 5s. 4d. =	10	10	8
	62¾ × 3s. 6d. =	10	19	7½
	27 × 1s. 2d. =	1	11	6
	34½ × 2s. 3d. =	3	17	7½
	43½ × 1s. 1d. =	2	7	1½
		£29	6	6½

Ex. (xcv), p. 164.

(1) Cost of 1 lb. = $\frac{8s.\ 6d.}{17}$ = 6*d.*

(2) Daily walk = $\frac{62}{4}$ miles = 15½ miles.

(3) 1 man will take 4 × 6 days, or, 24 days.

(4) 1 egg will cost $\frac{15}{10}d.$, or, $1\frac{1}{2}d.$

(5) 1 person will eat it in 9 × 34 days, or, 306 days.

(6) Tax on £1 is $\frac{\pounds 6\ 12s.\ 6d.}{265}$, or, $\frac{1590d.}{265}$, or, 6*d.*

Ex. (xcvi), p. 167.

(1) He walks 1 mile in $\frac{4}{62}$ day ;
∴ he walks 93 miles in $\frac{4 \times 93}{62}$, or, 6 days.

(2) 1 man can reap the field in (12 × 4) days ;
∴ 32 men can reap the field in $\frac{12 \times 4}{32}$ days, or, $1\frac{1}{2}$ days.

(3) 1 lb. of coffee will cost $\frac{182}{14}d.$;
∴ 129 lb. of coffee will cost $\frac{182 \times 129}{14}d.$, or, £6. 19*s.* 9*d.*

(4) 1 acre will cost $\pounds\frac{12250}{350}$;
∴ 273 acres will cost $\pounds\frac{12250 \times 273}{350}$, or, £9555.

(5) 1 lb. will cost $\frac{30}{3}d.$, or, 10*d.* ;
∴ 14 lb. will cost 14 × 10*d.*, or 11*s.* 8*d.*

(6) 1 egg can be bought for $\frac{12}{8}d.$, or $1\frac{1}{2}d.$;
∴ 60 eggs can be bought for 60 × $1\frac{1}{2}d.$, or, 7*s.* 6*d.*

(7) 1 lb. will cost $\frac{270}{15}q.$;
∴ 1 cwt. will cost $\frac{112 \times 270}{15}q.$, or, 2016*q.*, or, £2. 2*s.*

(8) In 1 day the work is done by (15 × 20) men ;
∴ in 12 days the work is done by $\frac{15 \times 20}{12}$ men, or, 25 men.

(9) The rent of 1 acre is $\frac{1190}{17}s.$, or, 70*s.* ;
∴ the rent of 86 acres is 86 × 70*s.*, or, £301.

(10) In 1 day he walks $\frac{116}{8}$ miles ;
∴ in 14 days he walks $\frac{116 \times 14}{8}$ miles, or, 203 miles.

(11) 1 farthing's worth will weigh $\frac{6}{5}$ gr. ;
∴ 1 crown's worth will weigh $\frac{6 \times 240}{5}$ gr., or, 288 gr.

(12) 1 lamb sells for £$\frac{176}{80}$, or, £$\frac{11}{5}$;
∴ 25 lambs sell for £$\frac{25 \times 11}{5}$, or, £55.

(13) 1 sheep sells for £$\frac{48}{20}$, or, £$\frac{12}{5}$;
∴ 270 sheep sell for £$\frac{270 \times 12}{5}$, or, £648.

(14) 1 week's wages will be $\frac{208}{52}$*s.*, or, 4*s.*;
∴ 7 weeks' wages will be 7 × 4*s.*, or, £1. 8*s.*

(15) 1 cwt. will cost $\frac{1359}{3}$*d.*, or, 453*d.*
∴ 147 cwt. will cost 147 × 453*d.*, or, 66591*d.*, or, £277. 9*s.* 3*d.*

(16) 1 yard is worth $\frac{92}{4}$*d.*, or, 23*d.*;
∴ 57 yards are worth 57 × 23*d.*, or, 1311*d.*, or, £5. 9*s.* 3*d.*

(17) 1 day's salary is $\frac{£191.\ 12s.\ 6d.}{365}$, or, $\frac{45990}{365}$*d.*
∴ 60 days' salary is $\frac{60 \times 45990}{365}$*d.*, or, (12 × 630)*d.*, or, £31. 10*s.*

(18) At the rate of 1 knot an hour she would take (63 × 6) days;
∴ at the rate of 7 knots an hour she would take $\frac{63 \times 6}{7}$ days, or, 54 days.

(19) For 1 day he receives $\frac{8176}{365}$*s.*;
∴ for 15 days he receives $\frac{8176 \times 15}{365}$*s.*, or, £16. 16*s.*

(20) For £1075 he can only pay £215;
∴ for £1 he can only pay £$\frac{215}{1075}$, or, £$\frac{1}{5}$, or, 4*s.*

(21) 1 bushel is worth $\frac{17s.\ 6d.}{3}$, or, 5*s.* 10*d.*;
∴ 350 bushels are worth 350 × (5*s.* 10*d.*), or, £102. 1*s.* 8*d.*

(22) 1 foot will cost $\frac{405}{45}$*d.*, or, 9*d.*;
∴ 61 feet will cost 61 × 9*d.*, or £2. 5*s.* 9*d.*

(23) 1 lb. can be bought for $\frac{119}{14}$*d.*, or, $\frac{17}{2}$*d.*;
∴ 480 lb. can be bought for $\frac{480 \times 17}{2}$*d.*, or, £17.

(24) 1 qr. can be bought for $\frac{135}{15}$*s.*, or, 9*s.*;
∴ 8 qr. can be bought for 8 × 9*s.*, or, £3. 12*s.*

(25) 1 lb. will cost $\frac{5650}{315}q.$;
∴ 9 cwt. will cost $\frac{9\times112\times5650}{315}q.$, or, $18080q.$, or, £18. 16*s.* 8*d.*

(26) 1 lb. will cost $\frac{1050}{3\times112}d.$, or, $\frac{150}{3\times16}d.$, or, $\frac{25}{8}d.$;
∴ 7 cwt. 2 qr. 14 lb. will cost $\frac{854\times25}{8}d.$, or, £11. 2*s.* $4\frac{3}{4}d.$

(27) 1 half-peck will cost $\frac{9945}{221}q.$, or, $45q.$;
∴ 12 half-pecks will cost 12 × $45q.$, or, 11*s.* 3*d.*

(28) For 1 sixpence I can buy $\frac{405}{567}$ lb., or, $\frac{5}{7}$ lb.;
∴ for 945 sixpences I can buy $\frac{945\times5}{7}$ lb., or, 6 cwt. 3 lb.

(29) 1 peck will cost $\frac{785}{30}d.$, or, $\frac{157}{6}d.$;
∴ 18 pecks will cost $\frac{18\times157}{6}d.$, or, £1. 19*s.* 3*d.*

Ex. (xcvii), p. 169.

(1) $\frac{1}{5}$ of the estate is worth £$\frac{7520}{3}$;
∴ the estate is worth £$\frac{7520\times5}{3}$;
∴ $\frac{5}{8}$ of the estate is worth £$\frac{5\times7520\times5}{8\times3}$, or, £7833. 6*s.* 8*d.*

(2) $\frac{2}{3}$ of $\frac{3}{8}$, that is $\frac{1}{4}$, of the ship is worth £1260;
∴ the ship is worth 4 × £1260, or, £5040.

(3) For 1 halfpenny I can buy $\frac{3\frac{2}{5}}{183\times2}$ lb., or, $\frac{17}{5\times183\times2}$ lb.;
∴ for 2013 halfpence I can buy $\frac{2013\times17}{5\times183\times2}$, or, $18\frac{7}{10}$ lb.

(4) 1 cwt. of coal will cost $\frac{54\times14}{3\times20}d.$;
∴ $5\frac{1}{2}$ cwt. of coal will cost $\frac{11\times54\times14}{2\times3\times20}d.$, or, 5*s.* $9\frac{3}{10}d.$

(5) In 1 day the part done is $\frac{\frac{2}{11}}{25}$, or, $\frac{2}{11\times25}$;
∴ in $11\frac{2}{3}$ days the part done is $\frac{35\times2}{3\times11\times25}$, or, $\frac{14}{165}$.

(6) He walks 1 foot in $\frac{330}{96800}$ min.;
∴ he walks 7920 feet in $\frac{7920\times330}{96800}$ min., or, 27 min.

(7) $\frac{2}{7}$ of $\frac{5}{16}$ of $\frac{3}{14}$ of the estate sold for £$\frac{965}{8}$;
∴ the estate was worth £$\frac{7\times16\times14\times965}{2\times5\times3\times8}$;
∴ $\frac{1}{5}$ of $\frac{3}{16}$ of the estate was worth £$\frac{3\times7\times16\times14\times965}{5\times16\times2\times5\times3\times8}$, or, £236. 8*s.* 6*d.*

(8) 1 cwt. of goods for 7*s.* 9*d.* can be carried $15\cdot5\times60$ miles;
∴ $3\cdot25$ cwt. of goods for 7*s.* 9*d.* can be carried $\frac{60\times15\cdot5}{3\cdot25}$ miles, or, $286\frac{2}{13}$ miles.

(9) $\frac{1}{9}$ of $\frac{7}{8}$ of $\frac{3}{11}$ of the vessel is worth £350;
∴ the vessel is worth £$\frac{9\times8\times11\times350}{7\times3}$, or, £$(3\times8\times11\times50)$;
∴ $\frac{1}{11}$ of $\frac{1}{12}$ of the vessel is worth £$\frac{3\times8\times11\times50}{11\times12}$, or, £100.

(10) 1 lb. of gold is worth £$(12\times3\cdot89)$;
$\cdot04$ lb. of gold is worth £$(\cdot04\times12\times3\cdot89)$, or, £1. 17*s.* $4\cdot128$*d.*

(11) 6 inches of the first kind cost $\frac{9}{8\frac{1}{2}}$*d.*, or, $\frac{18}{17}$*d.*;
6 inches of the second kind cost $\frac{11}{10\frac{1}{4}}$*d.*, or, $\frac{44}{41}$*d.*;
Now $\frac{18}{17}=\frac{738}{17\times41}$, and $\frac{44}{41}=\frac{748}{17\times41}$;
∴ the first is the cheaper kind.

(12) For £1 we can carry for 20 miles $\frac{60}{14\frac{1}{2}}$ cwt., or, $\frac{120}{29}$ cwt.;
∴ for £$5\frac{7}{16}$ we can carry for 20 miles $\frac{87\times120}{16\times29}$ cwt., or, $22\frac{1}{2}$ cwt.

[Ex. (xcviii), p. 172.

(1) *A* can do $\frac{1}{6}$ of the work in an hour;
B can do $\frac{1}{9}$ of the work in an hour;
∴ *A* and *B* do $\frac{1}{6}+\frac{1}{9}$, or, $\frac{5}{18}$ in an hour;
∴ they do the work in $\frac{18}{5}$ hours, or, $3\frac{3}{5}$ hours.

(2) A, B, and C do $\frac{1}{35} + \frac{1}{40} + \frac{1}{45}$, or, $\frac{191}{2520}$ in a day;
∴ they do the work in $\frac{2520}{191}$ days, or, $13\frac{37}{191}$ days.

(3) Twice (A's work + B's work + C's work) daily
$= \frac{1}{3} + \frac{1}{3\frac{1}{2}} + \frac{1}{4} = \frac{73}{84}$;
∴ A, B, and C do $\frac{73}{168}$ of the work daily;
∴ they do the work in $\frac{168}{73}$ days, or, $2\frac{22}{73}$ days.

(4) Together they fill $\frac{1}{6} + \frac{1}{8} + \frac{1}{12}$, or, $\frac{3}{8}$ in a minute;
∴ they fill the vessel in $\frac{8}{3}$ minutes, or, $2\frac{2}{3}$ minutes.

(5) In one day A can do $\frac{1}{14}$ of $\frac{7}{10}$, or, $\frac{1}{20}$ of the work;
∴ in two days A can do $\frac{1}{10}$ of the work;
Now $\frac{3}{10}$ remained for A and B to do;
∴ B does $\frac{2}{10}$ in 2 days;
∴ B can do the work in 10 days.

(6) A and C do $\frac{3}{4}$ in an hour;
A does $\frac{1}{3}$ in an hour;
∴ C does $\frac{3}{4} - \frac{1}{3}$, or, $\frac{5}{12}$ in an hour;
B and C do $\frac{2}{3}$ in an hour;
∴ B does $\frac{2}{3} - \frac{5}{12}$, or, $\frac{3}{12}$, or, $\frac{1}{4}$ in an hour;
∴ B can do the work in 4 hours.

(7) A does $\frac{12}{27}$, or, $\frac{4}{9}$ in 12 days;
B does $\frac{5}{15}$, or, $\frac{1}{3}$ in 5 days;
∴ A and B do $\frac{4}{9} + \frac{1}{3}$, or, $\frac{7}{9}$ of the work;
C does $\frac{2}{9}$ in 4 days, or, $\frac{1}{18}$ in 1 day;
∴ C could have done the whole in 18 days.

(8) Part filled in 10 minutes $= \frac{10}{18} + \frac{10}{20} - \frac{10}{40}$, or, $\frac{29}{36}$.

Ex. (xcix), p. 174.

(1) The minute-hand gains 11 minute-divisions in 12 minutes,
1 minute-division in $\frac{12}{11}$ minute,
20 minute-divisions in $\frac{240}{11}$ minutes;
∴ time will be $\frac{240}{11}$ min., or, $21\frac{9}{11}$ min. past 4.

(2) The minute-hand gains 30 min.-div. in $\frac{12 \times 30}{11}$ minutes;
∴ time will be $\frac{360}{11}$ min., or, $32\frac{8}{11}$ min. past 6.

(3) The minute-hand gains 45 min.-div. in $\frac{45 \times 12}{11}$ minutes;
∴ time will be $\frac{540}{11}$ min., or, $49\frac{1}{11}$ min. past 9.

(4) The minute-hand has to gain 20 − 15, or, 5 min.-div.;
∴ time will be $\frac{5 \times 12}{11}$ min., or, $5\frac{5}{11}$ min. past 4.
The minute-hand has to gain 20 + 15, or, 35 min.-div.;
∴ time will be $\frac{35 \times 12}{11}$ min., or, $38\frac{2}{11}$ min. past 4.

(5) The minute-hand has to gain 35 − 15, or, 20 min.-div.;
∴ time will be $\frac{20 \times 12}{11}$ min., or, $21\frac{9}{11}$ min. past 7.
The minute-hand has to gain 35 + 15, or, 50 min.-div.;
∴ time will be $\frac{50 \times 12}{11}$ min., or, $54\frac{6}{11}$ min. past 7.

(6) The minute-hand has to gain 15 − 5, or, 10 min.-div.;
∴ time will be $\frac{10 \times 12}{11}$ min., or, $10\frac{10}{11}$ min. past 11.
The minute-hand has to gain 55 − 15, or, 40 min. div.;
∴ time will be $\frac{40 \times 12}{11}$ min., or, $43\frac{7}{11}$ min. past 11.

(7) The minute-hand has to gain 5 + 30, or, 35 min.-div.;
∴ time will be $\frac{35 \times 12}{11}$ min., or, $38\frac{2}{11}$ min. past 1.

(8) The minute-hand has to gain 20 + 30, or, 50 min.-div.;
∴ time will be $\frac{50 \times 12}{11}$ min., or, $54\frac{6}{11}$ min. past 4.

(9) The minute-hand has to gain 40 − 30, or, 10 min.-div.;
∴ time will be $\frac{10 \times 12}{11}$ min., or, $10\frac{10}{11}$ min. past 8.

Ex. (o), p. 175.

(1) For 1 mile I can carry 36 × 1200 lb.;
∴ for 24 miles I can carry $\frac{36 \times 1200}{24}$ lb., or, 1800 lb.

(2) The cost of one-eleventh of a grain is $\frac{1383}{110640}$*d.*;
∴ cost of 1 oz. is $\frac{1383 \times 20 \times 24 \times 11}{110640}$*d.*, or, 5*s.* 6*d.*

(3) The cost of one-ninth of an oz. is $\frac{1065}{63616}$*d.*;
∴ cost of 1 cwt. is $\frac{1065 \times 4 \times 28 \times 16 \times 9}{63616}$*d.*, or, £1. 2*s.* 6*d.*

(4) The whole ship is worth £$\frac{9 \times 3264}{4}$;
∴ $\frac{5}{8}$ of the ship is worth £$\frac{5 \times 9 \times 3264}{8 \times 4}$, or, £4590.

(5) 1 oz. of each of the 12 spoons is worth $\frac{270}{45}$*s.*, or, 6*s.*;
∴ 22 oz. of silver in tankard are worth (22 × 6)*s.*, or,
£6. 12*s.*

(6) In 1 day he spends $\frac{308}{35}$*s.*, or, $\frac{44}{5}$*s.*;
∴ in 365 days he spends $\frac{365 \times 44}{5}$*s.*, or, £160. 12*s.*;
∴ his annual income is £100 + £160. 12*s.*, or, £260. 12*s.*

(7) On £1 the income-tax is 5*d.*;
∴ on £675 the income-tax is (675 × 5)*d.*, or, £14. 1*s.* 3*d.*

(8) 1 sixpence is the amount of tax on £1;
∴ 615 sixpences is the amount of tax on £615.

(9) On £1 the amount of dividend is £$\frac{2}{3}$;
∴ on £375. 15*s.* 9*d.* the amount of dividend is $\frac{2}{3}$ of
(£375. 15*s.* 9*d.*), or, £250. 10*s.* 6*d.*

(10) 235*d.* is what remains out of 240*d.*;
1*d.* is what remains out of $\frac{240}{235}$*d.*, or, $\frac{48}{47}$*d.*;
∴ 173900*d.* is what remains out of $\frac{48 \times 173900}{47}$*d.*, or, £740.

(11) On £680 the amount of tax is £19. 16*s.* 8*d.*, or, 4760*d.*;
∴ on £1 the amount of tax is $\frac{4760}{680}$*d.*, or, 7*d.*

(12) In 1 hour he can travel $\frac{540}{24\times6}$ mi., or, $\frac{15}{4}$ mi.;
∴ in 24 hours he can travel $\frac{15\times24}{4}$ mi., or, 90 mi.

(13) For 1 farthing I can buy $\frac{11}{3795}$ yd., or, $\frac{1}{345}$ yd.;
∴ for 23805 farthings I can buy $\frac{1\times23805}{345}$ yd., or, 69 yd.

(14) On 61152*s.* he can pay (2548 × 21)*s.*;
∴ on 20*s.* he can pay $\frac{2548\times21\times20}{61152}$*s.*, or, 17*s.* 6*d.*

(15) Rent of 1 half pole is $\frac{228478}{114239}$*d.*, or, 2*d.*;
∴ rent of (70 × 40 × 2) half poles is (70 × 40 × 4)*d.*, or,
£46. 13*s.* 4*d.*

(16) Size of 1 lb. of ice is $\frac{8}{459}$ cub. ft.;
∴ size of 1 ton of ice is $\frac{8\times20\times112}{459}$ cub. ft., or, $39\frac{19}{459}$ cub. ft.

(17) 5 horses and 132 sheep eat as much as (168 + 132)
sheep, or, 300 sheep; 15 horses and 148 sheep eat
as much as (252 + 148) sheep, or, 400 sheep.
Then 100 sheep will cost $\frac{£50\ 10s.}{3}$, or, £16. 16*s.* 8*d.*
for 8 days.
∴ 400 sheep will cost 4 × (£16. 16*s.* 8*d.*), or, £67. 6*s.* 8*d.*
for 8 days.

(18) 1 lb. will cost $\frac{801 \text{ halfpence}}{89}$, or, $4\frac{1}{2}$*d.*
∴ 10475 lb. will cost (10475 × $4\frac{1}{2}$)*d.*, or, £196. 8*s.* $1\frac{1}{2}$*d.*

(19) He loses $\frac{5}{20}$, or, $\frac{1}{4}$ of his debt;
∴ his debt was 4 × (£150. 10*s.* 6*d.*), or, £602. 2*s.*

(20) If wheat were 1*s.* a quarter the loaf would weigh
(3 × 57) lb.;
∴ if wheat were $64\frac{1}{2}$*s.* a quarter the loaf would weigh
$\frac{3\times57\times2}{129}$ lb., or, $2\frac{28}{43}$ lb.

(21) £7591 10*s*. = 3643920 halfpence, and £474. 16*s*. $4\frac{1}{2}$*d*.
= 227913 halfpence;
to produce 1 halfpenny in the £ the rate is £$\frac{1}{3643920}$;
$\therefore$ to produce 227913 halfpence in the £ the rate is
£$\frac{227913}{3643920}$, or, 1*s*. $3\frac{8}{723}$*d*.

(22) 1 yard of cloth will cost $\frac{21\times2}{5}$*s*.;
$\therefore$ $183\frac{1}{2}$ yards of cloth will cost $\frac{21\times2\times367}{5\times2}$*s*., or, £77. 1*s*. $4\frac{4}{5}$*d*.

(23) From 10th of May to 27th of October is 170 days;
wages for 1 day are $\frac{474}{30}$*d*., or, $\frac{79}{5}$*d*.
wages for 170 days are $\frac{170\times79}{5}$*d*., or, £11. 3*s*. 10*d*.

(24) In one-fifth of the time (15 × 5) men, or, 75 men would be required, and therefore for a piece of work 4 times as large (75 × 4) men, or, 300 men would be required.

(25) Rent of 1 pole is $\frac{71325}{6340}$ halfpence;
$\therefore$ rent of 6 acres is $\frac{71325\times6\times4\times40}{6340}$ halfpence, or, £22. 10*s*.

(26) 1 man has provisions for (2100 × 9) months;
$\therefore$ 2700 men have provisions for $\frac{2100\times9}{2700}$ months, or, 7 months.

(27) 1 man can dig the trench in (63 × 72) days;
42 men can dig the trench in $\frac{63\times72}{42}$ days, or, 108 days.
$\therefore$ 42 men can dig the trench three times as large in 324 days.

(28) 7*d*. is the income-tax on £1;
$\therefore$ 1*d*. is the income tax on £$\frac{1}{7}$;
$\therefore$ 3150*d*. is the income tax on £$\frac{3150}{7}$, or, £450.

(29) For 1610*d*. we can buy 322 lb.
$\therefore$ for 1*d*. we can buy $\frac{322}{1610}$ lb., or, $\frac{1}{5}$ lb.
$\therefore$ for 3570*d*. we can buy $\frac{3570}{5}$ lb., or, 6 cwt. 1 qr. 14 lb.

(30) In 1 day it will take (42 × 36) men to do the work;

∴ in 27 days it will take $\frac{42 \times 36}{27}$ men, or, 56 men;

∴ for twice the work 112 men will be required.

(31) $\frac{1}{8} + \frac{1}{10} = \frac{9}{40}$.

∴ $\frac{31}{40}$ of his income is £473. 13*s*. 1*d*.

∴ his income is $\frac{40}{31}$ of £473. 13*s*. 1*d*., or, £611. 3*s*. 4*d*.

(32) He has 236 pence left out of 240 pence;

he has 1 penny left out of $\frac{240}{236}$*d*., or, $\frac{60}{59}$*d*.

he has 114460 pence left out of $\frac{114460 \times 60}{59}$*d*. or, £485.

∴ his income-tax was (485 × 4)*d*., or, £8. 1*s*. 8*d*.

Ex. (ci), p. 177.

(1) 8 men in 7 days mow 40 acres.

1 man in 7 days mows 5 acres;

1 man in 1 day mows $\frac{5}{7}$ acres;

∴ 24 men in 28 days mow $\frac{5 \times 24 \times 28}{7}$ acres, or, 480 acres.

(2) 8 men for 5 days' work receive £12;

1 man for 5 days' work receives £$\frac{3}{2}$;

1 man for 1 day's work receives £$\frac{3}{10}$.

∴ 32 men for 24 days' work receive £$\frac{32 \times 24 \times 3}{10}$, or, £230. 8*s*.

(3) For 168 days 351 qr. supply 939 men;

for 1 day 351 qr. supply (939 × 168) men;

for 1 day 1 qr. supplies $\frac{939 \times 168}{351}$ men;

for 56 days 1 qr. supplies $\frac{939 \times 168}{56 \times 351}$ men;

for 56 days 1404 qr. supply $\frac{939 \times 168 \times 1404}{56 \times 351}$ men, or, 11268.

(4) 8 bushels in 16 days supply 2 horses;
1 bushel in 16 days supplies $\frac{2}{8}$ horse;
1 bushel in 1 day supplies $\frac{2\times16}{8}$ horses, or, 4 horses;
3000 qr. in 1 day supply $(4 \times 3000 \times 8)$ horses;
3000 qr. in 24 days supply $\frac{4\times3000\times8}{24}$ horses, or, 4000 horses.

(5) (3×112) lb. is carried 150 miles for 42*s.*;
1 lb. is carried 150 miles for $\frac{42}{3\times112}$*s.*;
1 lb. is carried 1 mile for $\frac{42}{3\times112\times150}$*s.*
∴ 882 lb. is carried 50 miles for $\frac{882\times50\times42}{3\times112\times150}$*s.*, or, £1. 16*s.* 9*d.*

(6) 40 cwt. is carried 6 miles for 10*s.*;
1 cwt. is carried 6 miles for 3*d.*;
1 cwt. is carried 1 mile for $\frac{1}{2}$*d.*;
∴ 257 cwt. is carried 34 miles for $\frac{257\times34}{2}$*d.*, or, £18. 4*s.* 1*d.*

(7) For 20 miles (290×12)*d.* will pay for 60 cwt.;
for 1 mile (290×12)*d.* will pay for (60×20) cwt.;
for 1 mile 1*d.* will pay for $\frac{60\times20}{290\times12}$ cwt., or, $\frac{10}{29}$ cwt.;
for 30 miles 1*d.* will pay for $\frac{10}{30\times29}$ cwt., or, $\frac{1}{87}$ cwt.;
for 30 miles 1305*d.* will pay for $\frac{1305}{87}$ cwt., or, 15 cwt.

(8) In 4 days 3 men earn 80*d.*;
in 1 day 3 men earn 20*d.*;
in 1 day 1 man earns $\frac{20}{3}$*d.*;
in 16 days 18 men earn $\frac{16\times18\times20}{3}$*d.*, or, £8.

(9) 6 persons in 24 days consume 4 bus.;
1 person in 24 days consumes $\frac{4}{6}$ bus.;
1 person in 1 day consumes $\frac{4}{6\times24}$ bus.;
∴ 72 persons in 8 days consume $\frac{72\times8\times4}{6\times24}$ bus., or 16 bus.

(10) With 12 hours' daylight he travels 150 mi. in 5 da.;
with 1 hour's daylight he travels 150 mi. in (12 × 5) da.
with 1 hour's daylight he travels 1 mi. in $\frac{12\times5}{150}$ da., or, $\frac{2}{5}$ da.;
with 10 hours' daylight he travels 1 mi. in $\frac{2}{10\times5}$ da., or, $\frac{1}{25}$ da.;
with 10 hours' daylight he travels 500 mi. in $\frac{500}{25}$ da., or, 20 days;

(11) 628 lb. can be carried 150 mi. for 785*d.*;
1 lb. can be carried 150 mi. for $\frac{785}{628}$*d.*, or, $\frac{5}{4}$*d.*;
786 lb. can be carried 150 mi. for $\frac{786\times5}{4}$*d.*;
∴ 4 times 786 lb. will cost (786 × 5)*d.*, or, £16. 7*s.* 6*d.*

(12) For 6 days 312*s.* will pay 16 men;
for 1 day 312*s.* will pay 16 × 6 men;
for 1 day 1*s.* will pay $\frac{16\times6}{312}$ men, or, $\frac{12}{39}$ men;
for 8 days 1*s.* will pay $\frac{12}{8\times39}$ men;
for 8 days 702*s.* will pay $\frac{702\times12}{8\times39}$ men, or, 27 men.

(13) For 50 hours 51*d.* will pay for 5 burners;
for 1 hour 51*d.* will pay for 250 burners;
for 1 hour 1*d.* will pay for $\frac{250}{51}$ burners;
for 60 hours 1*d.* will pay for $\frac{250}{51\times60}$ burners;
for 60 hours 918*d.* will pay for $\frac{250\times918}{51\times60}$ burners, or, 75 burners.

(14) 3 travellers spend £38 in 4 weeks;
1 traveller spends £38 in 12 weeks;
1 traveller spends £1 in $\frac{12}{38}$ week;
5 travellers spend £1 in $\frac{12}{38\times5}$ week;
travellers spend £95 in $\frac{12\times95}{38\times5}$ weeks, or, 6 weeks.

(15) 2 horses are kept 5 months for 6415*d.*;
1 horse is kept 5 months for $\frac{6415}{2}$*d.*
1 horse is kept 1 month for $\frac{1283}{2}$*d.*
3 horses are kept 11 months for $\frac{3\times11\times1283}{2}$*d.*, or, £88. 4*s.* 1½*d.*

(16) For 7050*d.* I keep 5 horses for 6 weeks;
for 1*d.* I keep 5 horses for $\frac{6}{7050}$ week;
for 1*d.* I keep 1 horse for $\frac{30}{7050}$ week, or, $\frac{1}{235}$ week;
for 4935*d.* I keep 1 horse for $\frac{4935}{235}$ weeks.
for 4935*d.* I keep 3 horses for $\frac{4935}{235\times3}$ weeks, or, 7 weeks.

(17) 5 men reap 12½ ac. in 56 hours;
1 man reaps 12½ ac. in (56 × 5) hours;
1 man reaps 1 ac. in $\frac{56\times5\times2}{25}$ hours;
7 men reap 1 ac. in $\frac{56\times5\times2}{25\times7}$ hours;
7 men reap 15 ac. in $\frac{56\times5\times2\times15}{25\times7}$ hours, or, 48 hours.
∴ they take $\frac{48}{12}$ days, or, 4 days.

(18) 858 men in 6 months consume 234 qr.;
1 man in 6 months consumes $\frac{234}{858}$ qr.;
1 man in 1 month consumes $\frac{234}{858\times6}$ qr., or, $\frac{1}{22}$ qr.;
979 men in 3½ months consume $\frac{979\times3\frac{1}{2}}{22}$ qr., or, 155¾ qr.

(19) 5 men earn 285*s.* in 6 weeks;
1 man earns 285*s.* in 5 × 6 weeks;
1 man earns 1*s.* in $\frac{5\times6}{285}$ week;
4 men earn 1*s.* in $\frac{5\times6}{285\times4}$ week;
4 men earn £19 in $\frac{20\times19\times5\times6}{285\times4}$ weeks, or, 10 weeks.

(20) 7 men mow 22 ac. in 88 hours;
1 man mows 22 ac. in (88 × 7) hours;
1 man mows 1 ac. in 28 hours;
12 men mow 1 ac. in $\frac{28}{12}$ hours;
12 men mow 360 ac. in (30 × 28) hours;
∴ they do the work in $\frac{30\times28}{10}$ days, or, 84 days.

(21) 10 horses eat 30 pk. in 7 days ;
1 horse eats 30 pk. in 70 days ;
1 horse eats 1 pk. in $\frac{7}{3}$ days ;
28 horses eat 1 pk. in $\frac{7}{3\times 28}$ day ;
28 horses eat 120 pk. in $\frac{7\times 120}{3\times 28}$ days, or, 10 days.

(22) 300 barrels supply (44 × 30 × 3) rounds for 5 days ;
1 barrel supplies (44 × 30 × 3) rounds for $\frac{1}{60}$ day ;
1 barrel supplies 1 round for $\frac{44\times 30\times 3}{60}$ days, or, 66 days ;
400 barrels supply 1 round for (400 × 66) days ;
400 barrels supply (66 × 40 × 5) rounds for $\frac{400\times 66}{66\times 40\times 5}$ days, or, 2 days.

(23) In 54 days 19314*d.* pay 29 men ;
in 1 day 19314*d.* pay (54 × 29) men ;
in 1 day 1*d.* pays $\frac{54\times 29}{19314}$ man ;
in 12 days 1*d.* pays $\frac{54\times 29}{19314\times 12}$ man ;
in 12 days (407 × 20 × 12)*d.* pay $\frac{407\times 20\times 12\times 54\times 29}{19314\times 12}$ men, or, 660 men.

(24) For 3 horses for 1 month I pay £18 ;
for 1 horse for 1 month I pay £6 ;
for 4 horses for 5 months I pay £(4 × 5 × 6), or, £120.

Ex. (cii), p. 181.

(1)
£
2750
5
13750
6
£825,00

(2)
£
3625
4
14500
8
£1160,00

(3)
£
2700
$4\frac{1}{2}$
1350
10800
12150
3
£364,50
20
s. 10,00

	£
(4)	8825
	4
	35300
	6½
	17650
	211800
	£2294,50
	20
	s. 10,00

	£	*s.*
(5)	3256 .	15
		4
	13027 .	0
		5
	£651,35 .	0
	20	
	s. 7,00	

	£	*s.*
(6)	3265 .	12
		4
	13062 .	8
		5½
	6531 .	4
	65312 .	0
	£718,43 .	4
	20	
	s. 8,64	
	12	
	d. 7,68	

	£
(7)	240
	5
	1200
	7¾
	900
	8400
	£93,00

	£	*s.*	*d.*
(8)	586 .	8 .	10
			4¼
	146 .	12 .	2·5
	2345 .	15 .	4
	2492 .	7 .	6·5
			3½
	1246 .	3 .	9·25
	7477 .	2 .	7·5
	£87,23 .	6 .	4·75
	20		
	s. 4,66		
	12		
	d. 7,9675		

Ex. (ciii), p. 183.

(1)
$$\begin{array}{rr}
 & \pounds \\
 & 156 \\
 & 4 \\ \cline{2-2}
 & 624 \\
 & 3 \\ \cline{2-2}
4 & \multicolumn{1}{|r}{1872} \\ \cline{2-2}
 & \pounds 4,68 \\
 & 20 \\ \cline{2-2}
 & s.\ 13,60 \\
 & 12 \\ \cline{2-2}
 & d.\ \ 7,20
\end{array}$$

(2)
$$\begin{array}{rr}
 & \pounds \\
 & 280 \\
 & 3\frac{1}{2} \\ \cline{2-2}
 & 140 \\
 & 840 \\ \cline{2-2}
 & 980 \\
 & 7 \\ \cline{2-2}
12 & \multicolumn{1}{|r}{6860} \\ \cline{2-2}
 & \pounds 5,71.\ 13s.\ 4d. \\
 & 20 \\ \cline{2-2}
 & s.\ 14,33 \\
 & 12 \\ \cline{2-2}
 & d.\ \ 4,00
\end{array}$$

(3) Interest for 1 year $= \pounds\frac{400 \times 3\frac{3}{4}}{100} = \pounds 15$;
interest for 3 years $= \pounds 45$;
interest for 35 days $= \frac{35}{365}$ of $\pounds 15 = \frac{7 \times 15}{73} = \pounds 1.\ 8s.\ 9\frac{15}{73}d.$

$\therefore$ whole interest $= \pounds 46.\ 8s.\ 9\frac{15}{73}d.$

(4) Interest for 1 year $= \pounds\frac{380 \times 4\frac{3}{4}}{100} = \pounds 18.\ 1s.$;
interest for 3 years $= \pounds 54.\ 3s.$;
interest for 45 days $= \frac{45}{365}$ of $(\pounds 18.\ 1s.) = \pounds 2.\ 4s.\ 6\frac{6}{73}d.$

$\therefore$ whole interest $= \pounds 56.\ 7s.\ 6\frac{6}{73}d.$

(5) Interest for 1 year $= \frac{4 \times (\pounds 304.\ 4s.\ 3d.)}{100} = \frac{\pounds 1216.\ 17s.}{100}$;
interest for 8 days $= \frac{8 \times \pounds 1216.\ 17s.}{365 \times 100} = 5s.\ 4\frac{88}{9125}d.$

(6) Interest for 1 year $= \frac{5 \times (\pounds 584.\ 10s.)}{100} = \pounds 29.\ 4s.\ 6d.$;
interest for 42 days $= \frac{42 \times (\pounds 29.\ 4s.\ 6d.)}{365} = \pounds 3.\ 7s.\ 3\frac{33}{365}d.$

(7) Interest for 1 year $= \dfrac{4\frac{1}{2} \times (£380\ 4s.\ 2d.)}{100}$;

interest for 120 days $= \frac{120 \times 9 \times (£380\ 4s.\ 2d.)}{2 \times 365 \times 100} = £5.\ 12s.\ 6d.$

(8) Interest for 1 year $= \frac{4 \times (£554\ 10s.)}{100} = \frac{£110\ 18s.}{5}$

interest for 3 months $= \frac{£110\ 18s.}{20} = £5.\ 10s.\ 10\frac{4}{5}d.$

(9) Interest for 1 year $= £\dfrac{700 \times 5\frac{3}{4}}{100} = £40.\ 5s.$;

interest for 2 years $= £80.\ 10s.$;

interest for 51 days $= \frac{51 \times (£40\ 5s.)}{365} = £86.\ 2s.\ 5\frac{55}{73}d.$

(10) Interest for 1 year $= \frac{5 \times (£204\ 17s.\ 7d.)}{100} = \frac{£204\ 17s.\ 7d.}{20}$;

interest for 159 days $= \frac{159 \times (£204\ 17s.\ 7d.)}{365 \times 20} = \frac{£32575\ 15s.\ 9d.}{7300}$

$= £4.\ 9s.\ 2\frac{7189}{7300}d.$

Ex. (civ), p. 184.

(1) Interest = 27289s. = £1364. 9s.

(2) Interest = 2645s. 6d. = £132. 5s. 6d.

(3) Interest = 34569s. 9d. = £1728. 9s. 9d.

(4) Interest = 4672s. 2½d. = £233. 12s. 2½d.

(5) Interest = 863s. 7½d. = £43. 3s. 7½d.

(6) Interest = 4587s. 1½d. = £229. 17s. 1½d.

Ex. (cv), p. 185.

(1)
$$\begin{array}{rrr} £ & s. & d. \\ 3587\ . & 6\ . & 8 \\ 1793\ . & 13\ . & 4 \\ \hline £53{,}81\ . & 0\ . & 0 \\ 20 & & \\ \hline s.\ 16{,}20 & & \\ 12 & & \\ \hline d.\ \ 2{,}40 & & \end{array}$$

(2)
$$\begin{array}{rrr} £ & s. & d. \\ 7523\ . & 3\ . & 4 \\ 3761\ . & 11\ . & 8 \\ \hline £112{,}84\ . & 15\ . & 0 \\ 20 & & \\ \hline s.\ 16{,}95 & & \\ 12 & & \\ \hline d.\ 11{,}40 & & \end{array}$$

	£	s.	d.
(3)	8642	18	9
	4321	9	4
	£129,64	8	1
	20		
	s. 12,88		
	12		
	d. 10,57		

	£	s.	d.
(4)	6543	12	6
	3271	16	3
	£98,15	8	9
	20		
	s. 3,08		
	12		
	d. 1,05		

	£	s.	d.
(5)	37643	9	4
	18821	14	8
	£564,65	4	0
	20		
	s. 13,04		
	12		
	d. ·48		

	£	s.	d.
(6)	72987	13	10
	36493	16	11
	£1094,81	10	9
	20		
	s. 16,30		
	12		
	d. 3,69		

Ex. (cvi), p. 186.

(1) Interest on £326 for 1 year = $\frac{£220\ 1s.}{15} = \frac{£73\ 7s.}{5}$;

∴ interest on £100 for 1 year = $\frac{100}{326} \times \frac{£73\ 7s.}{5} = \frac{20 \times 1467s.}{326}$
= £4. 10*s.*

(2) Interest on £372½ for 1 year = $\frac{£301\ 14s.\ 6d.}{18}$;

interest on £100 for 1 year = $\frac{100}{372\frac{1}{2}} \times \frac{6034\frac{1}{2}s.}{18} = \frac{100 \times 12069s.}{745 \times 18}$
= £4. 10*s.*

(3) Interest on £245 for 9 months = £252. 19*s.* 3*d.* − £245
= £7. 19*s.* 3*d.*

interest on £245 for 1 year = $\frac{4}{3}$ of £7. 19*s.* 3*d.*
= £10. 12*s.* 4*d.*;

interest on £100 for 1 year = $\frac{100}{245} \times 212\frac{1}{3}s. = £\frac{13}{3} = £4\frac{1}{3}$.

(4) Whole amount of interest = £678. 8*s*. − £640 = £38. 8*s*.
= 768*s*.;

interest on £640 for 1 year = £$\frac{640 \times 4\frac{1}{2}}{100}$ = £28. 16*s*. = 576*s*.;

∴ number of years = $\frac{768}{576} = \frac{256}{192} = 1\frac{1}{3}$.

(5) Whole amount of interest = £578. 1*s*. 4*d*. − £502. 13*s*. 4*d*.
= £75. 8*s*.;

interest on £$502\frac{2}{3}$ for 1 year = £$\frac{502\frac{2}{3} \times 4\frac{1}{2}}{100}$ = £22·62;

∴ number of years = $\frac{75\cdot4}{22\cdot62} = 3\cdot\dot{3} = 3\frac{1}{3}$.

(6) Whole amount of interest = £808. 1*s*. 4*d*. − £702. 13*s*. 4*d*.
= £105. 8*s*.

interest on £$702\frac{2}{3}$ for 1 year = £$\frac{702\frac{2}{3} \times 4}{100}$ = £$\frac{2108 \times 4}{3 \times 100}$;

∴ number of years = $105\cdot4 + \frac{2108 \times 4}{3 \times 100} = \frac{105\cdot4 \times 3 \times 100}{2108 \times 4} = 3\frac{3}{4}$.

(7) Interest on £100 for 12 years at $4\frac{1}{2}$ per cent. = £54;

∴ £1 is the interest on £$\frac{100}{54}$;

∴ £202·5 is the interest on £$\frac{202\cdot5 \times 100}{54}$, or, £375.

(8) Interest on £$537\frac{1}{2}$ for 1 year at 4 per cent. = £$21\frac{1}{2}$;

∴ number of years = $\frac{80\frac{5}{8}}{21\frac{1}{2}} = \frac{645 \times 2}{43 \times 8} = 3\frac{3}{4}$.

(9) Interest on £100 for 5 years at $4\frac{1}{2}$ per cent. is £$22\frac{1}{2}$;

∴ £1 is the interest on £$\frac{100}{22\frac{1}{2}}$, or, £$\frac{40}{9}$;

∴ £$168\frac{747}{900}$ is the interest on £$(168\frac{747}{900} \times \frac{40}{9})$ = £$\frac{6001}{8}$
= £750. 2*s*. 6*d*.

Ex. (cvii), p. 189.

(1) 1st year's interest $= \pounds\frac{1250\times 4}{100} = \pounds\frac{5000}{100} = \pounds 50$
2nd year's interest $= \pounds\frac{1300\times 4}{100} = \frac{5200}{100} = \pounds 52$
$\therefore$ Compound interest $= \pounds 102$

(2) 1st year's interest $= \pounds\frac{2500\times 3}{100} = \pounds 75$
2nd year's interest $= \pounds\frac{2575\times 3}{100} = \pounds 77.\ 5s.$
$\therefore$ Compound interest $= \pounds 152.\ 5s.$

(3) 1st year's interest $= \pounds\frac{4000\times 5}{100} = \pounds 200$
2nd year's interest $= \pounds\frac{4200\times 5}{100} = \pounds 210$
3rd year's interest $= \pounds\frac{4410\times 5}{100} = \pounds 220.\ 10s.$
$\therefore$ Compound interest $= \pounds 630.\ 10s.$

(4) 1st year's interest $= \pounds\frac{5000\times 9}{200} = \pounds 225$
2nd year's interest $= \pounds\frac{5225\times 9}{200} = \pounds 235\cdot 125$
3rd year's interest $= \pounds\frac{5460\cdot 125\times 9}{200} = \pounds 245\cdot 705625$
$\therefore$ Compound interest $= \pounds 705\cdot 830625$
$= \pounds 705.\ 16s.\ 7\cdot 35d.$

(5) 1st year's interest $= \pounds\frac{10000\times 7}{200} = \pounds 350$
2nd year's interest $= \pounds\frac{10350\times 7}{200} = \pounds 362\cdot 25$
3rd year's interest $= \pounds\frac{10712\cdot 25\times 7}{200} = \pounds 374\cdot 92875$
$\therefore$ Compound interest $= \pounds 1087\cdot 17875$
$= \pounds 1087.\ 3s.\ 6\cdot 9d.$

(6) 1st year's interest $= \pounds\frac{3945\times 4}{100} = \pounds 157\cdot 8$
2nd year's interest $= \pounds\frac{4102\cdot 8\times 4}{100} = \pounds 164\cdot 112$
3rd year's interest $= \pounds\frac{4266\cdot 912\times 4}{100} = \pounds 170\cdot 67648$
4th year's interest $= \pounds\frac{4437\cdot 58848\times 4}{100} = \pounds 177\cdot 5035392$
$\therefore$ Compound interest $= \pounds 670\cdot 0920192$
$= \pounds 670.\ 1s.\ 10\cdot 084608d.$

(7) 1st year's interest $= \pounds\frac{2746\times 4}{100} = \pounds 109{\cdot}84$
2nd year's interest $= \pounds\frac{2855{\cdot}84\times 4}{100} = \pounds 114{\cdot}2336$
3rd year's interest $= \pounds\frac{2970{\cdot}0736\times 4}{100} = \pounds 118{\cdot}802944$

∴ Compound interest $= \pounds 342{\cdot}876544$
= £342. 17*s.* 6·37056*d.*

(8) 1st year's interest $= \pounds\frac{4725\times 4}{100} = \pounds 189$
2nd year's interest $= \pounds\frac{4914\times 4}{100} = \pounds 196{\cdot}56$
3rd year's interest $= \pounds\frac{5110{\cdot}56\times 4}{100} = \pounds 204{\cdot}4224$

∴ Compound interest $= \pounds 589{\cdot}9824$
= £589. 19*s.* 7·776*d.*

(9) 1st year's interest $= \pounds\frac{250\times 15}{400} = \pounds 9{\cdot}375$
2nd year's interest $= \pounds\frac{259{\cdot}375\times 15}{400} = \pounds 9{\cdot}7265625$
Principal $= \pounds 250{\cdot}$

∴ Amount $= \pounds 269{\cdot}1015625$
= £269. 2*s.* 0·375*d.*

(10) 1st year's interest $= \pounds\frac{150\times 4}{100} = \pounds 6$
2nd year's interest $= \pounds\frac{156\times 4}{100} = \pounds 6{\cdot}24$
3rd year's interest $= \pounds\frac{162{\cdot}24\times 4}{100} = \pounds 6{\cdot}4896$
4th year's interest $= \pounds\frac{168{\cdot}7296\times 4}{100} = \pounds 6{\cdot}749184$
Principal $= \pounds 150{\cdot}$

∴ Amount $= \pounds 175{\cdot}478784$
= £175. 9*s.* 6·90816*d.*

(11) 1st year's interest $= \pounds\frac{375\times 9}{200} = \pounds 16{\cdot}875$
2nd year's interest $= \pounds\frac{391{\cdot}875\times 9}{200} = \pounds 17{\cdot}634375$
Principal $= \pounds 375{\cdot}$

∴ Amount $= \pounds 409{\cdot}509375$
= £409. 10*s.* 2¼*d.*

(12) 1st year's interest = $\pounds\frac{200\times3}{100}$ = £6
2nd year's interest = $\pounds\frac{206\times3}{100}$ = £6·18
3rd year's interest = $\pounds\frac{212{\cdot}18\times3}{100}$ = £6·3654
Principal = £200·

∴ Amount = £218·5454
= £218. 10*s.* 10·896*d.*

(13) 1st year's interest = $\pounds\frac{550\times4}{100}$ = £22
2nd year's interest = $\pounds\frac{572\times4}{100}$ = £22·88
3rd year's interest = $\pounds\frac{594{\cdot}88\times4}{100}$ = £23·7952
$\frac{1}{2}$ year's interest = $\pounds\frac{618{\cdot}6752\times2}{100}$ = £12·373504
Principal = £550·

∴ Amount = £631·048704
= £631. 0*s.* 11·68896*d.*

(14) 1st year's interest = $\pounds\frac{4790\times7}{200}$ = £167·65
2nd year's interest = $\pounds\frac{4957{\cdot}65\times7}{200}$ = £173·51775
$\frac{1}{3}$ year's interest = $\pounds\frac{5131{\cdot}16775\times7}{600}$ = £59·86362375
Principal = £4790·

∴ Amount = £5191·03137375
= £5191. 0*s.* 7·5297*d.*

Ex. (cviii), p. 192.

(1)
£
3745 × 105
18725

393225 × 105
1966125

41288625 × 105
206443125

Amount is £4335·305625

(2) 1st year's interest = $£\frac{7400\times5}{200}$ = £185

2nd year's interest = $£\frac{7585\times5}{200}$ = £189·625

3rd year's interest = $£\frac{7774\cdot625\times5}{200}$ = £194·365625

Principal = £7400·

∴ Amount = £7968·990625

```
(3)      £
       34690    × 104
        138760
       -------
       3607760    × 104
        14431040
       ---------
       375207040    × 104
        1500828160
       -----------
Amount is £39021·532160
```

```
(4)      £
       475·75   × 103
        142725
       -------
       49002·25   × 103
        14700675
       ---------
Amount is £504·723175
```

```
(5)      £
       4264·35   × 104
        1705740
       ---------
       443492·40   × 104
        17739696
       ----------
       46123209·6   × 104
        1844928384
       -----------
Amount is £4796·8137984
```

Ex. (cix), p. 193.

(1) 1st half-year's interest = $\pounds\frac{2500\times2}{100}$ = £50
2nd half-year's interest = $\pounds\frac{2550\times2}{100}$ = £51
3rd half-year's interest = $\pounds\frac{2601\times2}{100}$ = £52·02
4th half-year's interest = $\pounds\frac{2653{\cdot}02\times2}{100}$ = £53·0604
Principal = £2500·

∴ Amount = £2706·0804

(2)
1st half-year's int. = $\pounds\frac{6000\times5}{200}$ = £150
2nd half-year's int. = $\pounds\frac{6150\times5}{200}$ = £153·75
3rd half-year's int. = $\pounds\frac{6303{\cdot}75\times5}{200}$ = £157·59375
4th half-year's int. = $\pounds\frac{6461{\cdot}34375\times5}{200}$
= £161·53359375
5th half-year's int. = $\pounds\frac{6622{\cdot}87734375\times5}{200}$
= £165·57193359375
6th hf.-yr's int. = $\pounds\frac{6788{\cdot}44927734375\times5}{200}$
= £169·711231933359375
Principal = £6000·

∴ Amount = £6958·16050927734375

(3)
1st half-year's interest = $\pounds\frac{2745\times3}{200}$ = £41·175
2nd half-year's int. = $\pounds\frac{2786{\cdot}175\times3}{200}$ = £41·792625
3rd half-year's int. = $\pounds\frac{2827{\cdot}967625\times3}{200}$ = £42·419514375
4th hf.-yr.'s int. = $\pounds\frac{2870{\cdot}387139375\times3}{200}$ = £43·055807090625
Principal = £2745·

∴ Amount = £2913·442946465625

Ex. (cx), p. 195.

(1) Interest on £100 for 4 years at 5 per cent. = £20;
∴ P. W. = $\frac{100}{120}$ × (£5520) = £4600.

(2) Interest on £100 for 5 years at 3 per cent. = £15;
∴ P. W. = $\frac{100}{115}$ × (£3171. 14*s.*) = £2758.

(3) Interest on £100 for $3\frac{1}{2}$ years at 4 per cent. = £14;
∴ P. W. = $\frac{100}{114}$ × (£826. 10*s.*) = £725.

(4) Interest on £100 for 5 years at 4 per cent. = £20;
∴ P. W. = $\frac{100}{120}$ × (£416. 2*s.*) = £346. 15*s.*

(5) Interest on £100 for 4 years at $3\frac{1}{2}$ per cent. = £14;
∴ P. W. = $\frac{100}{114}$ × £8949 = £7850.

(6) Interest on £100 for 5 years at 3 per cent. = £15;
∴ P. W. = $\frac{100}{115}$ × (£8314. 10*s.*) = £7230;
∴ discount = £8314. 10*s.* − £7230 = £1084. 10*s.*

(7) Interest on £100 for $3\frac{1}{2}$ years at 3 per cent. = £$10\frac{1}{2}$;
∴ P. W. = $\frac{100}{110\frac{1}{2}}$ × (£930. 19*s.* 3*d.*) = £842. 10*s.*;
∴ discount = £930. 19*s.* 3*d.* − £842. 10*s.* = £88. 9*s.* 3*d.*

(8) Interest on £100 for 3 years at 5 per cent. = £15;
∴ P. W. = $\frac{100}{115}$ × (£876. 10*s.* $8\frac{1}{4}$*d.*) = £762. 4*s.* $0\frac{21}{23}$*d.*;
∴ discount = £876. 10*s.* $8\frac{1}{4}$*d.* − £762. 4*s.* $0\frac{21}{23}$*d.*
=£114. 6*s.* $7\frac{31}{92}$*d.*

(9) Interest on £100 for $4\frac{1}{2}$ years at $3\frac{1}{2}$ per cent. = £$(\frac{9}{2} \times \frac{7}{2})$
= £$15\frac{3}{4}$;
∴ P. W. = $\frac{100}{115\frac{3}{4}}$ × £5556 = £4800;
∴ discount = £5556 − £4800 = £756.

(10) Interest on £100 for $3\frac{3}{4}$ years at 4 per cent. = £15;
∴ P. W. = $\frac{100}{115}$ × (£618. 2*s.* 6*d.*) = £537. 10*s.*;
∴ discount = £618. 2*s.* 6*d.* – £537. 10*s.* = £80. 12*s.* 6*d.*

Ex. (cxi), p. 196.

(1) Interest on £100 for $1\frac{1}{2}$ years at 4 per cent. = £6;
∴ P. W. = $\frac{100}{106}$ × (£388. 17*s.* 9*d.*) = £366. 17*s.* 6*d.*;
∴ discount = £388. 17*s.* 9*d.* – £366. 17*s.* 6*d.*
= £22. 0*s.* 3*d.*

(2) Interest on £100 for $\frac{3}{4}$ year at $3\frac{1}{2}$ per cent. = £$2\frac{5}{8}$;
∴ P. W. = $\frac{100}{102\frac{5}{8}}$ × £5747 = £5600.

(3) Interest on £100 for $\frac{7}{12}$ year at $4\frac{1}{2}$ per cent. = £$2\frac{5}{8}$;
∴ P. W. = $\frac{100}{102\frac{5}{8}}$ × £10673 = £10400.

(4) £16. 1*s.* $10\frac{1}{2}$*d.* – 12*s.* $10\frac{1}{2}$*d.* = £15. 9*s.*
∴ interest for a year on £15. 9*s.* is 12*s.* $10\frac{1}{2}$*d.*;
∴ interest for a year on £100 = $\frac{100}{15\frac{9}{20}}$ × (12*s.* $10\frac{1}{2}$*d.*)
= £$4\frac{1}{6}$.

(5) Interest on £100 for $\frac{1}{2}$ year at 8 per cent. = £4;
∴ P. W. = $\frac{100}{104}$ × (£196. 4*s.* $4\frac{1}{2}$*d.*) = £188. 13*s.* $5\frac{1}{4}$*d.*;
∴ discount = £196. 4*s.* $4\frac{1}{2}$*d.* – £188. 13*s.* $5\frac{1}{4}$*d.*
= £7. 10*s.* $11\frac{1}{4}$*d.*

(6) Interest on £100 for $\frac{2}{3}$ year at 6 per cent. = £4;
∴ P. W. = $\frac{100}{104}$ × (£78. 9*s.* 9*d.*) = £75. 9*s.* $4\frac{1}{2}$*d.*;
∴ discount = £78. 9*s.* 9*d.* – £75. 9*s.* $4\frac{1}{2}$*d.* = £3. 0*s.* $4\frac{1}{2}$*d.*

(7) Interest on £100 for $\frac{3}{4}$ year at $4\frac{1}{3}$ per cent. = £$3\frac{1}{4}$;

$\therefore$ P. W. = $\frac{100}{103\frac{1}{4}}$ × (£252. 19s. 3d.) = £245.

(8) Interest on £100 for $4\frac{4}{9}$ years at $4\frac{1}{2}$ per cent. = £20 ;
$\therefore$ P. W. = $\frac{100}{120}$ × (£151. 17s. 6d.) = £126. 11s. 3d. ;
$\therefore$ discount = £151. 17s. 6d. − £126. 11s. 3d
= £25. 6s. 3d.

(9) Interest on £100 for $\frac{4}{3}$ year at $4\frac{1}{2}$ per cent. = £6 ;
$\therefore$ P. W. = $\frac{100}{106}$ × (£678. 8s.) = £640.

(10) £275. 6s. 8d. − £13. 2s. $2\frac{2}{3}$d. = £262. 4s. $5\frac{1}{3}$d. ;
$\therefore$ interest for 15 months on £262. 4s. $5\frac{1}{3}$d. is £13. 2s. $2\frac{2}{3}$d. ;
$\therefore$ interest for 15 months on £100 is $\frac{100}{262\frac{2}{9}}$ of £$13\frac{1}{9}$ = £5 ;
$\therefore$ interest for 12 months on £100 is £4.

(11) Interest on £100 for $3\frac{1}{3}$ years at $4\frac{1}{2}$ per cent. = £15 ;
$\therefore$ P. W. = $\frac{100}{115}$ × (£578. 1s. 4d.) = £502. 13s. 4d.

(12) Interest on £100 for $2\frac{1}{4}$ years at $2\frac{2}{3}$ per cent. = £6 ;
$\therefore$ P. W. = $\frac{100}{106}$ × (£574. 3s. 4d.) = £541. 13s. 4d. ;
$\therefore$ discount = £574. 3s. 4d. − £541. 13s. 4d. = £32. 10s.

(13) Interest on £100 for $3\frac{3}{4}$ years at 4 per cent. = £15 ;
$\therefore$ P. W. = $\frac{100}{115}$ × (£808. 1s. 4d.) = £702. 13s. 4d.

(14) Interest = £$\frac{750\frac{5}{6} \times 2\frac{1}{2} \times 2\frac{2}{5}}{100}$ = £$\frac{4505}{100}$ = £45. 1s. ;
interest on £100 for $2\frac{1}{2}$ years at $2\frac{2}{5}$ per cent. = £6 ;
$\therefore$ P. W. = $\frac{100}{106}$ × £$750\frac{5}{6}$ = £708. 6s. 8d. ;
$\therefore$ discount = £750. 16s. 8d. − £708. 6s. 8d. = £42. 10s. ;
$\therefore$ difference = £45. 1s. − £42. 10s. = £2. 11s.

(15) £20. 5*s*. $6\frac{3}{4}$*d*. − £19. 6*s*. 3*d*. = 19*s*. $3\frac{3}{4}$*d*.;
∴ interest for 1 year on £$19\frac{5}{16}$ is 19*s*. $3\frac{3}{4}$*d*.;
∴ interest on £100 for 1 year = $\frac{100 \times 16}{309}$ × (19*s*. $3\frac{3}{4}$*d*.) = £5.

(16) Interest = £$\dfrac{313\frac{19}{20} \times \frac{2}{3} \times 6}{100}$ = £$\frac{6279}{500}$ = £12. 11*s*. $1\frac{23}{25}$*d*.;
interest on £100 for $\frac{2}{3}$ year at 6 per cent. = £4;
∴ P. W. = $\frac{100}{104}$ × (£313. 19*s*.) = £301. 17*s*. 6*d*.;
∴ discount = £313. 19*s*. − £301. 17*s*. 6*d*. = £12. 1*s*. 6*d*.;
∴ difference = £12. 11*s*. $1\frac{23}{25}$*d*. − £12. 1*s*. 6*d*. = 9*s*. $7\frac{23}{25}$*d*.

Ex. (cxii), p. 197.

(1) Compound interest on £100 = £15. 15*s*. 3*d*.;
∴ P. W. = $\dfrac{100}{115\frac{61}{80}}$ × (£6945. 15*s*.) = £6000.

(2) Compound interest on £100 = £$6\frac{9}{100}$;
∴ P. W. = $\dfrac{100}{106\frac{9}{100}}$ × (£4774. 1*s*.) = £4500;
∴ discount = £4774. 1*s*. − £4500 = £274. 1*s*.

(3) Compound interest on £100 = $108\frac{4}{25}$;
∴ P. W. = $\dfrac{100}{108\frac{4}{25}}$ × £100 = £92. 9*s*. $1\frac{59}{169}$*d*.;
∴ discount = £100 − £92. 9*s*. $1\frac{59}{169}$*d*. = £7. 10*s*. $10\frac{110}{169}$*d*.

(4) Compound interest on £100 = £15. 15*s*. 3*d*. = 3783*d*.;
also, £165. 10*s*. $1\frac{1}{2}$*d*. = $39721\frac{1}{2}$*d*.;
∴ sum required = £$\dfrac{39721\frac{1}{2} \times 100}{3783}$ = £(21 × 50) = £1050.

(5) P. D. = £$\frac{240 \times 29}{365}$ = £$\frac{1392}{73}$ = £19. 1*s*. 4*d*. nearly.

(6) P. D. = £$\frac{120 \times 52}{365}$ = £$\frac{1248}{73}$ = £17. 1*s*. 11*d*. nearly.

(7) P. D. $= £\frac{120 \times 7}{365} = £\frac{148}{73} = £2.\ 6s.$ nearly.

(8) P. D. $= £\frac{70 \times 28}{365} = £\frac{14 \times 28}{73} = £5.\ 7s.\ 4d.$ nearly.

(9) P. D. $= £\frac{55 \times 7}{365} = £\frac{77}{73} = £1.\ 1s.\ 1d.$ nearly.

(10) P. D. $= £\frac{90 \times 18}{365} = £\frac{324}{73} = £4.\ 8s.\ 9d.$ nearly.

(11) P. D. $= £\frac{90 \times 75}{365} = £\frac{18 \times 75}{73} = £18.\ 9s.\ 10d.$ nearly.

Ex. (cxiii), p. 199.

(1) $$\frac{14 + 26 + 9 + 18 + 13 + 24 + 27 + 39}{8} = \frac{170}{8} = 21 \cdot 25.$$

(2) $$\frac{1600 + 276 + 974 + 0 + 236 + 845 + 1239}{7} = \frac{5170}{7}$$
$$= 738 \cdot \dot{5}7142\dot{8}.$$

(3) $$\frac{34729 + 46238 + 87296}{3} = \frac{168263}{3} = 56087 \cdot \dot{6}.$$

(4) $$\frac{15 \cdot 5 + 36 \cdot 75 + 17 \cdot 625 + 0 + 10 \cdot 375 + 74 \cdot 2 + 28 \cdot 25 + 33}{8}$$
$$= \frac{215 \cdot 7}{8} = 26 \cdot 9625.$$

(5) $$\frac{12 \cdot 48 + 21 + 7 \cdot 75 + \cdot 034 + 3 \cdot 125 + 0 + 24 \cdot 5 + 12 \cdot 35}{8}$$
$$= \frac{81 \cdot 239}{8} = 10 \cdot 154875.$$

Ex. (cxiv), p. 200.

(1) Commission $= £\frac{133\frac{1}{2} \times 2\frac{1}{2}}{100} = £\frac{267 \times 5}{400} = £3.\ 6s.\ 9d.$

(2) Insurance $= £\frac{625 \times \frac{1}{8}}{100} = £\frac{25}{32} = 15s.\ 7\frac{1}{2}d.$

(3) Insurance = $£\frac{8350 \times 84}{100 \times 20} = £\frac{3507}{10} = £350.\ 14s.$

(4) Brokerage = $£\frac{852 \cdot 5 \times 3}{800} = £3 \cdot 196875 = £3.\ 3s.\ 11\frac{1}{4}d.$

(5) Insurance = $£\frac{4270 \times 7}{200} = £149 \cdot 45 = £149.\ 9s.$

(6) Brokerage = $\frac{3 \times (£1508\ 17s.\ 10d.)}{200} = \frac{£4526\ 13s.\ 6d.}{200}$
$= £22.\ 12s.\ 8 \cdot 01d.$

(7) 2400*s*. = £120. (8) 3475*s*. = £173. 15*s*.

(9) 4234*s*. 6*d*. = £211. 14*s*. 6*d*.

(10) 3275*s*. 9*d*. = £163. 15*s*. 9*d*. (11) 2150*s*. = £107. 10*s*.

(12) 1739*s*. 6*d*. = £86. 19*s*. 6*d*.

(13) 2618*s*. 3*d*. = £130. 18*s*. 3*d*.

(14) 2139*s*. $4\frac{1}{2}d.$ = £106. 19*s*. $4\frac{1}{2}d.$

(15) £24·5 = £24. 10*s*. (16) £827·6 = £827. 12*s*.

(17) £32·45 = £32. 9*s*. (18) £72·875 = £72. 17*s*. 6*d*.

(19) $£\frac{40}{8} = £5.$ (20) $£\frac{76}{8} = £9.\ 10s.$

(21) $£\frac{92 \cdot 5}{8} = £11.\ 11s.\ 3d.$ (22) $£\frac{103 \cdot 75}{8} = £12.\ 19s.\ 4\frac{1}{2}d.$

Ex. (cxv), p. 202.

(1) On 16*s*. I gain 4*s*.;
∴ on 100*s*. I gain $\frac{100 \times 4}{16}s.$ or 25*s*.

(2) Cost price of £112 worth was £100;
∴ cost price of £560 worth was $£\frac{560 \times 100}{112}$, or, £500.

(3) Cost price = $\frac{100}{120} \times £490 = £\frac{5 \times 245}{3}$;
∴ cost per yard = $£\frac{5 \times 245}{3 \times 375} = £\frac{49}{45} = £1.\ 1s.\ 9\frac{1}{3}d.$

(4) Cost price per gall. $= \frac{100}{95}$ of (17*s.* 5*d.*) $= 20 \times 11$*d.* $= 220$*d.*;
∴ selling price per gall. $= \frac{115}{100}$ of 220*d.* = £1. 1*s.* 1*d.*

(5) Cost price $= \frac{100}{84}$ of £136 = £$\frac{3400}{21}$ = £$161\frac{19}{21}$;
∴ I gain on £$161\frac{19}{21}$ £$(168 - 161\frac{19}{21})$, or, £$6\frac{2}{21}$;
∴ I gain £$\frac{128 \times 100}{3400}$, or, £$3\frac{3}{17}$ per cent.

(6) On an outlay of $1\frac{1}{2}$*d.* he gains $\frac{1}{2}$*d.*;
∴ on 100*d.* he gains $\frac{100}{3}$*d.*, or, $33\frac{1}{3}$*d.* per cent.

(7) On an outlay of £100 he sells the goods for £120;
the customer pays him $\frac{9}{10}$ of £120, or, £108;
∴ he gains £8 on an outlay of £100.

(8) On an outlay of £100 he sells the goods for £125;
the customer pays him $\frac{88}{100}$ of £125, or, £110;
∴ he gains £10 on an outlay of £100.

(9) On an outlay of £23. 5*s.* 5*d.* he loses £1. 3*s.* $3\frac{1}{4}$*d.*;
∴ on an outlay of £100 he loses $\frac{100 \times 20 \times 12}{5585} \times$ (£1. 3*s.* $3\frac{1}{4}$*d.*)
or, £5.

(10) On an outlay of £15. 6*s.* 3*d.* he loses £3. 10*s.* $5\frac{1}{4}$*d.*;
∴ on an outlay of £100 he loses $\frac{100 \times 20 \times 12}{3675} \times$ (£3. 10*s.* $5\frac{1}{4}$*d.*)
or, £23.

(11) He buys 112 lb. for £24;
∴ he buys 6144 lb. for £$\frac{6144 \times 24}{112}$, or, £$\frac{9216}{7}$;
∴ he gains £1500 − £$\frac{9216}{7}$, or, £$\frac{1284}{7}$ on an outlay of £$\frac{9216}{7}$;
∴ he gains per cent. £$(\frac{100}{9216} \times 1284)$, or, £13. 18*s.* $7\frac{3}{4}$*d.*

(12) Cost price $= \frac{100}{108} \times$ (£1031. 8*s.*) = £955;
∴ on an outlay of £955 he gains £$(1050\frac{1}{2} - 955)$. or £$95\frac{1}{2}$;
∴ on an outlay of £100 he gains £$\frac{100 \times 95 \cdot 5}{955}$, or, £10.

(13) An increase of £2. 5*s*. on cost price increases the gain 3 per cent.

an increase of £$\frac{2\frac{1}{4}\times 100}{3}$ on cost price increases the gain 100 per cent.;

∴ cost price = £$\frac{9\times 100}{4\times 3}$ = £75.

(14) Cost price = 12 × (2*s*. 6½*d*.) + 4 × (3*s*. 2¼*d*.) = 43*s*. 3*d*.;
he sells it for 43*s*. 3*d*. + ⅓ of (43*s*. 3*d*.) = 57*s*. 8*d*.;
∴ selling price per lb. = $\frac{57s.\ 8d.}{16}$ = 3*s*. 7¼*d*.

(15) average cost per lb. = ¾ of (7*s*. 10*d*.) = 5*s*. 10½*d*.;
now $\frac{6s.\ 6d. + 5s.\ 3d.}{2} = \frac{11s.\ 9d.}{2}$ = 5*s*. 10½*d*.;
∴ he must have the same quantity at 5*s*. 3*d*. as that which he has at 6*s*. 6*d*., that is, 4 lb.

(16) Cost price = (80 × 18*s*.) + (180 × 15*s*.) = 4140*s*.;
selling price = 4140*s*. + $\frac{4140}{12}$*s*. = 4485*s*.;
selling price per gall. = $\frac{4485}{260}$*s*. = 17*s*. 3*d*.

(17) Cost price = 80 × (15*s*. 6*d*.) + 96 × (17*s*. 1*d*.) = 2880*s*.;
selling price = 2880*s*. + 288*s*. = 3168*s*.;
selling price per gall. = $\frac{3168}{176}$*s*. = 18*s*.

(18) Cost price of 4 lb. of mixture = 9*s*. 3*d*. + 2*s*. 9*d*. = 12*s*.;
gain on outlay of 12*s*. = 16*s*. − 12*s*. = 4*s*.;
∴ he gains ⅓ of his outlay, or, 33⅓ per cent.

Ex. (cxvi), p. 206.

(1) Purchase-money = £$\frac{3850\times 92}{100}$ = £3542.

(2) Purchase-money = £$\frac{475\times 93}{100}$ = £441. 15*s*.

(3) Purchase-money = £$\frac{572\cdot 5\times 91\cdot 5}{100}$ = £523. 16*s*. 9*d*.

(4) Stock = £$\frac{2199\times 100}{91\frac{5}{8}}$ = £$\frac{2199\times 100\times 8}{733}$ = £2400.

(5) Stock $= \pounds\frac{5527\cdot5\times100}{92\frac{1}{8}} = \pounds\frac{55275\times10\times8}{737} = \pounds6000.$

(6) Stock $= \pounds\frac{717\frac{107}{240}\times100}{92\frac{3}{8}} = \pounds\frac{172187\times100\times8}{739\times240} = \pounds776.$ 13*s.* 4*d.*

(7) Income $= \pounds\frac{3725\times3}{100\times2} = \pounds\frac{111\cdot75}{2} = \pounds55\cdot875 = \pounds55.$ 17*s.* 6*d.*

(8) Income $= \pounds\frac{375\times3}{100\times2} = \pounds\frac{11\cdot25}{2} = \pounds5\cdot625 = \pounds5.$ 12*s.* 6*d.*

(9) Income $= \pounds\frac{1406\cdot25\times3}{100\times2} = \pounds\frac{42\cdot1875}{2} = \pounds21\cdot09375$
$= \pounds21.$ 1*s.* $10\frac{1}{2}$*d.*

Ex. (cxvii), p. 209.

(1) Money produced by sale of £3200 stock $= \pounds\frac{3200\times86\frac{1}{4}}{100}$
$= \pounds2760$;
stock purchased with £2760 $= \pounds\frac{2760\times100}{115} = \pounds2400$;
1st income $= \pounds\frac{3200\times3}{100} = \pounds96$;
2nd income $= \pounds\frac{2400\times4}{100} = \pounds96$;
∴ no alteration is made.

(2) Stock purchased with £5151 $= \pounds\frac{5151\times100}{100} = \pounds5100$;
money produced by sale of £5100 stock $= \pounds\frac{5100\times105}{100}$
$= \pounds5355$;
Stock purchased with £5355 $= \pounds\frac{5355\times100}{102} = \pounds5250$;
1st income $= \pounds\frac{5100\times5}{100} = \pounds255$;
2nd income $= \pounds\frac{5250\times4\frac{3}{4}}{100} = \pounds249.$ 7*s.* 6*d.*;
∴ loss in income = £5. 12*s.* 6*d.*

(3) Money produced by sale of £4800 stock $= \pounds\frac{4800\times93}{100}$
$= \pounds4464$;
stock purchased with £4464 $= \pounds\frac{4464\times100}{108} = \pounds\frac{12400}{3}$;
1st income $= \pounds\frac{4800\times3}{100} = \pounds144$;
2nd income $= \pounds\frac{12400\times6}{3\times100} = \pounds248$;
∴ increase in income = £104.

(4) Money from sale of £4500 stock = £$\frac{4500 \times 112\cdot5}{100}$
= £$(45 \times 112\cdot5)$;
1st income = £$\frac{4500 \times 5}{100}$ = £225;
2nd income = £225 + £168. 15*s.* = £393. 15*s.*;
amount of Egyptian stock = £$\frac{393\cdot75 \times 100}{7}$ = £5625;
∴ Price per £100 = £$\frac{45 \times 112\cdot5 \times 100}{5625}$ = £90.

(5) Money from sale of £2000 stock = £$\frac{2000 \times 94\cdot5}{100}$ = £1890;
1st income = £$\frac{1890 \times 6}{126}$ = £90;
2nd income = £$\frac{1890 \times 9}{210}$ = £81;
∴ difference of income is £9.

(6) £1080 income is produced by investing £32850;
£1 income is produced by investing £$\frac{32850}{1080}$;
£3 income is produced by investing £$\frac{3 \times 32850}{1080}$, or,
£$91\frac{1}{4}$.

(7) Money from sale of stock = £$(50 \times 92\cdot5)$ = £4625;
stock purchased with £4625 = £$\frac{4625 \times 100}{88\cdot8}$;
1st income = £$\frac{5000 \times 3}{100}$ = £150;
2nd income = £$\frac{4625 \times 3}{88\cdot8}$ = £$\frac{46250}{296}$ = £156. 5*s.*;
∴ increase of income is £6. 5*s.*

(8) £$3\frac{1}{2}$ is produced by investing £$106\frac{3}{4}$;
£1 is produced by investing £$\frac{106\frac{3}{4}}{3\frac{1}{2}}$;
£$120\frac{3}{5}$ is produced by investing £$\frac{106\frac{3}{4} \times 120\frac{3}{5}}{3\frac{1}{2}}$, or, £3678. 6*s.*

(9) Gross income = £$\frac{6050 \times 3}{90\cdot75}$ = £200;
net income = £200 − 800*d.* = £200 − £3. 6*s.* 8*d.*
= £196. 13*s.* 4*d.*

(10) $£3\frac{1}{2} - £\frac{49}{480} = £\frac{1631}{480}$;
for an income of $£\frac{1631}{480}$ I must invest £91;
for an income of £1 I must invest $£\frac{91 \times 480}{1631}$;
for an income of £932 I must invest $£\frac{932 \times 91 \times 480}{1631}$, or,
£24960.

(11) Stock purchased in 3 per cents. $= £\frac{9075 \times 100}{90 \cdot 75} = £10000$;
money from sale of this stock = £(91 × 100) = £9100;
stock purchased in $3\frac{1}{2}$ per cents. $= £\frac{9100 \times 100}{97 \cdot 5}$
$= £\frac{28000}{3}$;
1st income $= £\frac{10000 \times 3}{100} = £300$;
2nd income $= £\frac{28000 \times 7}{100 \times 3 \times 2} = £326.\ 13s.\ 4d.$;
∴ increase in income is £26. 13*s.* 4*d.*

(12) £1 invested in the 1st stock gives an income of $£\frac{6}{126}$,
or, $£\frac{1}{21}$;
£1 invested in the 2nd stock gives an income of $£\frac{9}{210}$,
or, $£\frac{3}{70}$;
∴ $£(\frac{1}{21} - \frac{3}{70})$, or, $£\frac{1}{210}$ is the difference of income for £1
invested;
∴ for a difference of $£22\frac{1}{2}$, I must invest $£(22\frac{1}{2} \div \frac{1}{210})$,
or, £4725.

(13) £96 invested in 3 per cents. produces £3 income;
£96 invested in the railway stock produces $£\frac{5 \times 96}{100}$, or,
£4·8 income;
∴ increase is £1·8.

Ex. (cxviii), p. 213.

(1) $$\left.\begin{array}{l} \frac{2}{5} = \frac{2 \times 9}{5 \times 9} = \frac{18}{5 \times 9} \\ \frac{4}{9} = \frac{4 \times 5}{9 \times 5} = \frac{20}{9 \times 5} \end{array}\right\} \therefore \frac{4}{9} \text{ is the greater.}$$

(2) $$\left.\begin{array}{l} \frac{17}{39} = \frac{17 \times 41}{39 \times 41} = \frac{697}{39 \times 41} \\ \frac{19}{41} = \frac{19 \times 39}{41 \times 39} = \frac{741}{41 \times 39} \end{array}\right\} \therefore \frac{19}{41} \text{ is the greater.}$$

(3) $\left.\begin{array}{l} \frac{4}{7} = \frac{4\times15\times8}{7\times15\times8} = \frac{480}{7\times15\times8} \\ \frac{8}{15} = \frac{8\times7\times8}{15\times7\times8} = \frac{448}{7\times15\times8} \\ \frac{13}{24} = \frac{13\times7\times5}{7\times15\times8} = \frac{455}{7\times15\times8} \end{array}\right\}$ $\therefore$ $\frac{4}{7}$ is the greatest, and $\frac{8}{15}$ is the least.

(4) $\frac{5}{7} \times \frac{13}{15} \times \frac{21}{91} \times \frac{45}{52} = \frac{5\times13\times21\times45}{7\times15\times91\times52} = \frac{45}{364} = 45 : 364.$

(5) Number required $= \frac{7\times15}{3} = 21.$

(6) Number required $= \dfrac{\frac{4}{7} \times \frac{5}{9}}{\frac{2}{3}} = \frac{4\times5\times3}{7\times9\times2} = \frac{10}{21}.$

(7) Number required $= \frac{\cdot16\times\cdot09}{\cdot3} = \cdot16 \times \cdot3 = \cdot048.$

(8) Mean proportional $= \sqrt{14 \times 56} = \sqrt{\quad 4} = 28.$

(9) Mean proportional $= \sqrt{\frac{5\times35}{63\times81}} = \sqrt{\frac{5\times5}{9\times81}} = \frac{5}{27}.$

(10) Mean proportional $= \sqrt{\cdot057 \times \cdot513} = \sqrt{\cdot029241}$
$= \cdot171.$

(11) $B = \frac{5}{26}$ of C;
$\therefore$ $A = \frac{10}{3}$ of $\frac{5}{26}$ of $C = \frac{25}{39}$ of C.

(12) B's share $= \frac{5}{6}$ of A's share;
C's share $= \frac{3}{4}$ of B's share $= \frac{3}{4}$ of $\frac{5}{6}$ of A's share;
D's share $= \frac{2}{3}$ of C's share $= \frac{2}{3}$ of $\frac{3}{4}$ of $\frac{5}{6}$ of A's share;
$\therefore$ A's share $+ \frac{5}{6}$ of A's share $+ \frac{5}{8}$ of A's share $+ \frac{5}{12}$ of A's share $=$ £1587;
$\therefore$ $(1 + \frac{5}{6} + \frac{5}{8} + \frac{5}{12})$ of A's share $=$ £1587;
$\therefore$ $\frac{24+20+15+10}{24}$ of A's share $=$ £1587;
$\therefore$ $\frac{69}{24}$ of A's share $=$ £1587;
$\therefore$ A's share $=$ £$\frac{24\times1587}{69} =$ £552;
$\therefore$ B's share $= \frac{5}{6}$ of £552 $=$ £460;
$\therefore$ C's share $= \frac{3}{4}$ of £460 $=$ £345;
$\therefore$ D's share $= \frac{2}{3}$ of £345 $=$ £230.

Ex. (cxix), p. 215.

(1) £60 ÷ (11 + 9) = £60 ÷ 20 = £3;
∴ the parts are £33 and £27.

(2) £2500 ÷ (2 + 3 + 7 + 8) = £2500 ÷ 20 = £125;
∴ the parts are £250, £375, £875, and £1000.

(3) The common denominator of the fractions is 60, and we have therefore to divide £8470 into parts proportional to 30, 20, 15, and 12.
Then £8470 ÷ (30 + 20 + 15 + 12 = £110;
∴ the parts are £3300, £2200, £1650, and £1320.

(4) 75 + 10 + 15 = 100;
∴ amount of saltpetre = $\frac{75}{100}$ of 12 cwt. = 9 cwt.;
amount of sulphur = $\frac{10}{100}$ of 12 cwt. = 1 cwt. 22$\frac{2}{5}$ lb.;
amount of charcoal = $\frac{15}{100}$ of 12 cwt. = 1 cwt. 3 qr. 5$\frac{3}{5}$ lb.

(5) 3 + 4 + 5 = 12;
∴ length of first side = $\frac{3}{12}$ of 480 yd. = 120 yd.;
length of second side = $\frac{4}{12}$ of 480 yd. = 160 yd.;
length of third side = $\frac{5}{12}$ of 480 yd. = 200 yd.

(6) *A* gets 3 times *B*'s share;
C gets 4 times *B*'s share;
∴ *B* gets $\frac{1}{8}$ of £640, or, £80;
A gets 3 × £80, or, £240;
C gets 4 × £80, or, £320.

(7) The 1st boy gets 7 when the 2nd gets 8;
the 3rd boy gets 10 when the 2nd gets 8;
now 7 + 8 + 10 = 25;
∴ first boy gets $\frac{7}{25}$ of 100, or, 28;
2nd boy gets $\frac{8}{25}$ of 100, or, 32;
3rd boy gets $\frac{10}{25}$ of 100, or, 40.

(8) 5450*s.* + 7085*s.* + 9810*s.* = 22345*s.*;
∴ *A* gets $\frac{5450}{22345}$ of £418. 19*s.* 4½*d.*, or, £102. 3*s.* 9*d.*;
B gets $\frac{7085}{22345}$ of £418. 19*s.* 4½*d.*, or, £132. 16*s.* 10½*d.*;
C gets $\frac{9810}{22345}$ of £418. 19*s.* 4½*d.*, or, £183. 18*s.* 9*d.*

(9) 4150 + 12450 + 24900 + 29050 = 70550;
∴ 1st town has $\frac{4150}{70550}$ of 1921, or, $\frac{1}{17}$ of 1921, or, 113
2nd town has $\frac{12450}{70550}$ of 1921, or, $\frac{3}{17}$ of 1921, or, 339;
3rd town has $\frac{24900}{70550}$ of 1921, or, $\frac{6}{17}$ of 1921, or, 678;
4th town has $\frac{29050}{70550}$ of 1921, or, $\frac{7}{17}$ of 1921, or, 791.

(10) 10*s.* + 5*s.* + 2*s.* 6*d.* + 1*s.* + 6*d.* + 4*d.* = 19*s.* 4*d.*
= 232*d.*;
∴ number of each = $\frac{20 \times 20 \times 12}{232}$ = 30.

(11) 500 + 350 + 800 + 90 = 1740;
∴ 1st person has $\frac{500}{1740}$ of 200 ac., or, $57\frac{41}{87}$ ac.;
2nd person has $\frac{350}{1740}$ of 200 ac., or, $40\frac{20}{87}$ ac.;
3rd person has $\frac{800}{1740}$ of 200 ac., or, $91\frac{83}{87}$ ac.;
4th person has $\frac{90}{1740}$ of 200 ac., or, $10\frac{30}{87}$ ac.

(12) When *B* gets 1*s.* *A* gets 9*d.*;
when *B* gets 1*s.* *C* gets 2*s.*;
then 9*d.* + 12*d.* + 24*d.* = 45*d.*;
∴ *A* gets $\frac{9}{45}$ of 55*s.*, or, 11*s.*;
B gets $\frac{12}{45}$ of 55*s.*, or, 14*s.* 8*d.*;
C gets $\frac{24}{45}$ of 55*s.*, or, 29*s.* 4*d.*

(13) The pay of 7 women = the pay of 3 men;
the pay of 14 boys = the pay of $\frac{28}{5}$ women = the pay of $\frac{12}{5}$ men;
then $5 + {}' + \frac{12}{5} = \frac{52}{5}$;
∴ a man receives 52*s.* ÷ $\frac{52}{5}$, or, 5*s.*;
∴ 5 men will get 25*s.*;
7 women will get 15*s.*;
14 boys will get 12*s.*

(14) There are 9 women, 6 men, 15 children;
share of 9 women = share of 6 men;
share of 15 children = share of 5 men;
∴ (6 + 6 + 5) men get £129. 8*s*. 3*d*.;
∴ 6 men get $\frac{6}{17}$ of £129. 8*s*. 3*d*., or, £45. 13*s*. 6*d*.;
9 women get £45. 13*s*. 6*d*.;
15 children get $\frac{5}{6}$ of £45. 13*s*. 6*d*., or, £38. 1*s*. 3*d*.

Ex. (cxx), p. 216.

(1) On each pound of the cheaper, sold at 2*s*., he gains 6*d*.;
on each pound of the better, sold at 2*s*., he loses 3*d*.;
∴ he must put 1 lb. of the cheaper to 2 lb. of the better.

(2) On each barrel of the cheaper, sold at 30*s*., he gains 7*s*.;
on each barrel of the better, sold at 30*s*., he loses 8*s*.;
∴ he must put 8 barrels of the cheaper to 7 barrels of the better.

(3) On each pound of the cheaper, sold at 4*d*., he gains 4 farthings;
on each pound of the better, sold at 4*d*., he loses 3 farthings;
∴ he must put 3 lb. of the cheaper to 4 lb of the better.

(4) On each gallon of the cheaper, sold at 12*s*., he loses 4*s*.;
on each gallon of the better, sold at 12*s*., he loses 7*s*.;
on each gallon of water, sold at 12*s*., he gains 12*s*.
One way of making the mixture will be
12 gallons of the better,
7 gallons of water,
and (51 − 19), or, 32 gallons of the cheaper and water, mixed in the ratio 3 : 1, that is 24 gallons of cheaper and 8 gallons of water, so that he will have 15 gallons of water in all.

Ex. (cxxi), p. 217.

(1) Reckoning both days specified,
A is in the business 288 days;
B is in the business 168 days;
and their capitals are in the ratio 4 : 3;
∴ we must divide £943 in the ratio 1152 : 504;
∴ *A* gets $\frac{1152}{1656}$ of £943, or, £287;
B gets $\frac{504}{1656}$ of £943, or, £656.

(2) We have to divide £70 in the ratio 120 : 300;
∴ *D* gets $\frac{120}{420}$ of £70, or, £20;
E gets $\frac{300}{420}$ of £70, or, £50.

(3) 3500 + 4800 + 8100 = 16400;
∴ *A* gets $\frac{35}{164}$ of £410, or, £87. 10*s.*;
B gets $\frac{48}{164}$ of £410, or, £120;
C gets $\frac{81}{164}$ of £410, or, £202. 10*s.*

(4) 30 + 48 + 28 = 106;
∴ 1st pays $\frac{30}{106}$ of £26. 10*s.*, or, £7. 10*s.*;
2nd pays $\frac{48}{106}$ of £26. 10*s.*, or, £12;
3rd pays $\frac{28}{106}$ of £26. 10*s.*, or, £7.

(5) One works (9 × 6 + 8 × 6) hr., or, 102 hr. in the fortnight:
the other works ($9\frac{1}{2}$ × 10) hr., or, 95 hr. in the fortnight;
∴ 1st receives $\frac{102}{197}$ of £7. 7*s.* 9*d.*, or, £3. 16*s.* 6*d.*;
2nd receives $\frac{95}{197}$ of £7. 7*s.* 9*d.*, or, £3. 11*s.* 3*d.*

(6) 400 × 12 + 500 × 10 = 4800 + 5000 = 9800;
300 × 12 + 600 × 9 = 3600 + 5400 = 9000;
∴ *A* gets $\frac{98}{188}$ of £470, or, £245;
B gets $\frac{90}{188}$ of £470, or, £225.

Ex. (cxxii), p. 220.

(1) Months required $= \frac{250\times4+350\times10}{250+350} = \frac{4500}{600} = 7\frac{1}{2}$.

(2) Months required $= \frac{900+1600+3000}{300+400+500} = \frac{5500}{1200} = 4\frac{7}{12}$.

(3) Months required $= \frac{550\cdot5+1714+1662\cdot5}{275\cdot25+342\cdot8+237\cdot5} = \frac{3927}{855\cdot55}$
$= 4\cdot6$ nearly.

(4) Months required $= \frac{350\times3+420\times4+280\times6}{1050} = \frac{441}{105} = 4\frac{1}{5}$.

(5) He has to pay £140 at the end of 50 days;
he has to pay £120 at the end of 74 days;
he has to pay £380 at the end of 106 days;
∴ equated time $= \frac{7000+8880+40280}{140+120+380}$ days $= \frac{56180}{640}$ days
$= 88$ days nearly.
∴ he should pay the debts together on May 28.

(6) He has to pay 24418*d.* at the end of 26 days;
he has to pay 34594*d.* at the end of 51 days;
he has to pay 72946*d.* at the end of 64 days;
he has to pay 181688*d.* at the end of 120 days;
he has to pay 29258*d.* at the end of 135 days;
he has to pay 29258*d.* at the end of 143 days;
∴ equated time
$= \frac{634868+1764294+4668544+21802560+3949830+4183894}{24418+34594+72946+181688+29258+29258}$
$= \frac{37003990}{372162}$ days $= 99\cdot4$ days nearly.

Ex. (cxxiii), p. 222.

(1) 1 florin $= \frac{1}{12}$ of £1;
$= \frac{1}{12}$ of 25 fr. 56 cents = 2 fr. 13 cents.

(2) 1 napoleon = 20 francs;
$= \frac{20}{25\cdot5}$ of £1;
$= \frac{20\times2244}{25\cdot5}$ copeks = 1760 copeks.

(3) $25 \cdot 5$ francs $= 714$ kr.;

$\therefore$ 1 franc $= \frac{7140}{255}$ kr.;

$\therefore$ a napoleon $= \frac{7140 \times 20}{255}$ kr. $= 560$ kr. $= 9$ fl. 20 kr.

(4) 23 nap. 12 fr. 50 cents $= 472 \cdot 5$ fr.;

$= 472 \cdot 5 \times £\frac{1}{25 \cdot 2} = £\frac{75}{4} = £18.\ 15s.$

$\therefore$ he has left £4. 17*s.* 6*d.*

(5) $6\frac{2}{3}$ thalers $= 25 \cdot 6$ fr.;

$\therefore$ 1 thaler $= \frac{25 \cdot 6 \times 3}{20}$ fr. $= 3 \cdot 84$ fr. $= 3$ fr. 84 cents.

(6) If I take £1 in English money I shall get for it 700 kr.;
If I take £1 in its value in French money I get $\frac{25 \cdot 20 \times 500}{20}$ kr. or 630 kr.;

$\therefore$ I lose 70 kr.;

and since $\frac{700}{70} = 10$, I shall lose the tenth part of my outlay in English money, or 10 per cent.

(7) $£5 \cdot 5 = \frac{5 \cdot 5 \times 20}{3}$ thalers;

$= \frac{55 \times 2 \times 93}{3 \times 25}$ fr.;

$= \frac{55 \times 2 \times 93 \times 5}{3 \times 25 \times 27 \cdot}$ scudi;

$= \frac{55 \times 2 \times 93 \times 5 \times 135}{3 \times 25 \times 27 \times 62}$ gulden $= 55$ gulden.

(8) 270 naps. $= (270 \times 16)s.$

$= \frac{270 \times 16 \times 12}{54}$ milrees $= 960$ milrees.

(9) For £1 he gets 25 francs;

for £1 he gets $\frac{25 \times 135}{300}$ gulden, or, $\frac{135}{12}$ gulden;

for £1 he gets $\frac{135 \times 20\frac{1}{2}}{12}d.$, or, $230\frac{5}{8}d.$;

$\therefore$ he loses $(240 - 230\frac{5}{8})d.$, or, $9\frac{3}{8}d.$ in £1.

(10) $£50 = (50 \times 25 \cdot 7)$ francs;

$= \frac{50 \times 25 \cdot 7 \times 40 \cdot 5}{100}$ florins $= 520 \cdot 425$ florins.

Ex. (cxxiv), p. 227.

(1) (7×5) sq. ft. $= 35$ sq. ft.

(2) $(13\frac{1}{2} \times 10)$ sq. ft. $= 135$ sq. ft.

(3) $(22\frac{1}{4} \times 13\frac{1}{2})$ sq. ft. $= \frac{2403}{8}$ sq. ft. $= 300\frac{3}{8}$ sq. ft.

(4) $(5\frac{1}{3} \times 2\frac{1}{4})$ sq. ft. $= \frac{16 \times 9}{3 \times 4}$ sq. ft. $= 12$ sq. ft.

(5) $(17\frac{5}{12} \times 26)$ sq. ft. $= \frac{2717}{6}$ sq. ft. $= 452\frac{5}{6}$ sq. ft.

(6) (16×14) sq. ft. $= 224$ sq. ft.

(7) (38×16) sq. ft. $= 608$ sq. ft.

(8) $(20\frac{1}{4} \times 7\frac{5}{12})$ sq. ft. $= \frac{2403}{16}$ sq. ft. $= 150\frac{3}{16}$ sq. ft.

(9) $(23 \times 17\frac{1}{2})$ sq. ft. $= \frac{805}{2}$ sq. ft. $= 402\frac{1}{2}$ sq. ft.

(10) $(\frac{11}{2} \times \frac{11}{2})$ sq. yd. $= \frac{121}{4}$ sq. yd. $= 30\frac{1}{4}$ sq. yd.

(11) $(\frac{149}{4} \times \frac{149}{4})$ sq. yd. $= \frac{22201}{16}$ sq. yd. $= 1387\frac{9}{16}$ sq. yd.

(12) $(\frac{71}{4} \times \frac{71}{4})$ sq. ft. $= \frac{5041}{16}$ sq. ft. $= 315\frac{1}{16}$ sq. ft.

(13) $(\frac{59}{2} \times \frac{59}{2})$ sq. ft. $= \frac{3481}{4}$ sq. ft. $= 870\frac{1}{4}$ sq. ft.

(14) $(\frac{115}{12} \times \frac{115}{12})$ sq. ft. $= \frac{13225}{144}$ sq. ft. $= 91$ sq. ft. 121 sq. in.

(15) $(\frac{10}{3} \times \frac{10}{3})$ sq. ft. $= \frac{100}{9}$ sq. ft. $= 11\frac{1}{9}$ sq. ft.

(16) $(22\frac{5}{12} \times 22\frac{5}{12})$ sq. ft. $= \frac{72361}{144}$ sq. ft. $= 502$ sq. ft. 73 sq. in.

(17) $(47\frac{1}{4} \times 47\frac{1}{4})$ sq. ft. $= \frac{35721}{16}$ sq. ft. $= 2232$ sq. ft. 81 sq. in.

(18) Breadth $= \frac{176}{11}$ ft. $= 16$ ft.

(19) Breadth $= \frac{10324}{116}$ in. $= 89$ in. $= 7$ ft. 5 in.

(20) Breadth $= \frac{123060}{1172}$ in. $= 105$ in. $= 8$ ft. 9 in.

(21) Breadth $= \frac{4840}{440}$ yd. $= 11$ yd.

(22) Breadth $= \frac{5 \times 4840}{275}$ yd. $= 88$ yd.

(23) Breadth $= \dfrac{876 \times 30\frac{1}{4} \times 9}{803}$ ft. $= \frac{219 \times 121 \times 9}{803}$ ft. $= 99$ yd.

(24) Side $= \sqrt{81}$ ft. $= 9$ ft.

(25) Side = $\sqrt{256}$ ft. = 16 ft.

(26) Side = $\sqrt{10609}$ ft. = 103 ft.

(27) Side = $\sqrt{164025}$ yd. = 405 yd.

(28) Diagonal = $\sqrt{\{(225 \text{ yd.})^2 + (120 \text{ yd.})^2\}} = \sqrt{65025}$ yd.
= 255 yd.

(29) Diagonal = $\sqrt{\{(300 \text{ yd.})^2 + (200 \text{ yd.})^2\}} = \sqrt{130000}$ yd.
= 360·5 .... yd.

(30) Length = $\frac{2\frac{1}{2} \times 4840}{88}$ yd. = (2·5 × 55) yd. = 137·5 yd.;
diagonal = $\sqrt{\{(137\cdot5 \text{ yd.})^2 + (88 \text{ yd.})^2\}}$
= $\sqrt{26650\cdot25}$ yd. = 163·25 yd. nearly.

(31) Diagonal = $\sqrt{\{(5 \text{ in.})^2 + (5 \text{ in.})^2\}} = \sqrt{25 \times 2}$ in.
= $5\sqrt{2}$ in.

(32) Side = $\sqrt{390625}$ ft. = 625 ft.;
diagonal = $\sqrt{\{(625 \text{ ft.})^2 + (625 \text{ ft.})^2\}} = \sqrt{(625)^2 \times 2}$ ft.
= $625\sqrt{2}$ ft.

Ex. (cxxv), p. 229.

(1) Length = $\frac{15 \times 13 \times 144}{27}$ in. = $\frac{(5 \times 13 \times 16)}{36}$ yd. = $28\frac{8}{9}$ yd.

(2) Length = $\frac{25 \times 12 \times 150}{27}$ in. = $\frac{25 \times 4 \times 150}{9 \times 36}$ yd. = $46\frac{8}{27}$ yd.

(3) Length = $\frac{268 \times 243}{27}$ in. = $\frac{268 \times 9}{36}$ yd. = 67 yd.

(4) Length = $\frac{27 \times 14\frac{1}{2}}{2\frac{1}{4}}$ ft. = $\frac{27 \times 29 \times 2}{9}$ ft. = 58 yd.

(5) Length = $\frac{35\frac{1}{3} \times 27\frac{1}{4}}{2\frac{1}{4}}$ ft. = $\frac{106 \times 109}{3 \times 9}$ ft. = $142\frac{52}{81}$ yd.

(6) Length = $\frac{18 \times 14}{2\frac{1}{2}}$ ft. = $\frac{18 \times 14 \times 2}{5}$ ft. = $\frac{18 \times 14 \times 2}{15}$ yd.;
∴ cost = $\frac{18 \times 14 \times 2 \times 60}{15}$*d.* = £8. 8*s.*

(7) Length $= \frac{22 \times 15\frac{1}{2}}{2\frac{1}{4}}$ ft. $= \frac{22\times31\times2}{9}$ ft. $= \frac{22\times31\times2}{27}$ yd.;

$\therefore$ cost $= \frac{22\times62\times54}{27}d. = \pounds11.\ 7s.\ 4d.$

(8) Length $= \frac{29\frac{3}{4} \times 23\frac{1}{2}}{9}$ yd. $= \frac{119\times47}{8\times9}$ yd.;

$\therefore$ cost $= \frac{119\times47\times69}{8\times9}d. = \frac{128639}{24}d. = \pounds22.\ 6s.\ 7\frac{23}{24}d.$

(9) Length $= \frac{34\frac{2}{3} \times 13\frac{1}{4}}{9 \times \frac{3}{4}}$ yd. $= \frac{104\times53}{3\times27}$ yd.;

$\therefore$ cost $= \frac{104\times53\times81}{3\times27}$ halfpence $= \pounds11.\ 9s.\ 8d.$

Ex. (cxxvi), p. 231.

(1) $\{ (38 + 32) \times 9 \}$ sq. ft. $= (70 \times 9)$ sq. ft. $= 630$ sq. ft.

(2) $\{ (49 + 36\frac{1}{2}) \times 10 \}$ sq. ft. $= (85\frac{1}{2} \times 10)$ sq. ft. $= 855$ sq. ft.

(3) $\{ (51\frac{1}{6} + 38\frac{2}{3}) \times 9\frac{3}{4} \}$ sq. ft. $= (89\frac{5}{6} \times 9\frac{3}{4})$ sq. ft. $= 875\frac{7}{8}$ sq. ft.

(4) $\{ (46\frac{5}{6} + 37\frac{1}{6}) \times 9\frac{1}{2} \}$ sq. ft. $= (84 \times 9\frac{1}{2})$ sq. ft. $= 798$ sq. ft.

(5) Area of paper $= \{ (36 + 28) \times 8 \}$ sq. ft. $= (64 \times 8)$ sq. ft.;
length of paper $= \frac{64\times8}{1\frac{1}{3}}$ ft. $= 128$ yd.;
cost of paper $= 128s. = \pounds6.\ 8s.$

(6) Area of paper $= \{ (41 + 34\frac{2}{3}) \times 9 \}$ sq. ft. $= 681$ sq. ft.;
length of paper $= \frac{681}{1\frac{2}{3}}$ ft. $= \frac{681\times3}{5}$ ft. $= \frac{681}{5}$ yd.
cost of paper $= \frac{681}{5} \times 5d. = 681d. = \pounds2.\ 16s.\ 9d.$

(7) Area of paper $= \{ (61\frac{1}{3} + 52\frac{5}{6}) \times 10\frac{1}{2} \}$ sq. ft. $= \frac{4795}{4}$ sq. ft.;
length of paper $= \frac{4795}{8}$ ft. $= \frac{4795}{8\times3}$ yd.;
cost of paper $= \frac{4795\times8}{8\times3}d. = \pounds6.\ 13s.\ 2\frac{1}{3}d.$

(8) Area of sides = $\{(52 + 42) \times 10\}$ sq. ft. = 940 sq. ft.;
deductions = $\{(5\frac{1}{4} \times 4) + (7 \times 4\frac{1}{2}) + (2 \times 6 \times 3\frac{1}{2})\}$ sq. ft.
= $94\frac{1}{2}$ sq. ft.;
length of paper = $\frac{940 - 94\frac{1}{2}}{1\frac{2}{3}}$ ft. = $\frac{1691 \times 3}{5 \times 2}$ ft. = $\frac{1691}{10}$ yd.;
cost of paper = $(169 \cdot 1 \times 9)d.$ = $1521 \cdot 9d.$ = £6. 6*s*. $9\frac{9}{10}d.$

Ex. (cxxvii), p. 231.

(1) Area of floor = $(14\frac{1}{3} \times 15\frac{1}{2})$ sq. ft. = $\frac{43 \times 31}{6 \times 9}$ sq. yd.;
cost = $\frac{43 \times 31 \times 6}{6 \times 9}d.$ = $\frac{1333}{9}d.$ = 12*s*. $4\frac{1}{9}d.$

(2) Area = $(146\frac{3}{4} \times 88\frac{3}{4})$ sq. ft. = $\frac{587 \times 355}{4 \times 4 \times 9}$ sq. yd.;
cost = $\frac{587 \times 355 \times 45}{4 \times 4 \times 9 \times 4}d.$ = $\frac{1041925}{64}d.$ = £67. 16*s*. $8\frac{5}{64}d.$

(3) Area = 44100 sq. ft.;
∴ side = $\sqrt{44100}$ ft. = 210 ft.

(4) Area = 18225 sq. ft.;
∴ side = $\sqrt{18225}$ ft. = 135 ft.

(5) Area = $(40 \times 3 \times 100)$ sq. ft.;
number of turfs = $\frac{40 \times 3 \times 100}{3 \times 1}$ = 4000;
cost = $\frac{4000 \times 6s.\ 9d.}{100}$ = £13. 10*s*.

(6) Area of ceiling = $32\frac{1}{9}$ sq. yd.;
side of floor = $\sqrt{289}$ ft. = 17 ft.;
area of walls = $(4 \times 17 \times 11\frac{1}{2})$ sq. ft. = 782 sq. ft.;
∴ area to be whitewashed = $(32\frac{1}{9} + \frac{782}{9})$ sq. yd. = 119 sq. yd.;
∴ cost = $119 \times \frac{5}{2}d.$ = £1. 4*s*. $9\frac{1}{2}d.$

(7) Area = $(8\frac{1}{4} \times 6\frac{2}{3})$ sq. yd. = 55 sq. yd.;
length of carpet = $(55 \div \frac{2}{3})$ yd. = $\frac{165}{2}$ yd.;
cost per yard = $(5445 \div \frac{165}{2})d.$ = 66*d*. = 5*s*. 6*d*.

(8) Area of paper = $(\frac{716}{4} \times \frac{2}{3})$ sq. yd. = $\frac{358}{3}$ sq. yd.;
height of room = $\{\frac{358}{3} \div (16\frac{1}{2} + 13\frac{1}{3})\}$ yd. = $\frac{358 \times 6}{3 \times 179}$ yd.
= 12 ft.

(9) Area of field = 559504 sq. ft.;
breadth of field $= (559504 \div 2992)$ ft. = 187 ft. = 62 yd. 1 ft.

(10) Area $= \frac{330 \times 330}{4840}$ ac. $= \frac{90}{4}$ ac. $= 22\frac{1}{2}$ ac.

(11) Breadth in feet $= (\frac{5}{11}$ of area of walls$) \div 21$;
$= \frac{5}{11}\{(42 + \text{twice breadth}) \times \frac{21}{2}\} \div 21$;
$= \frac{5}{11}\{21 + \text{breadth}\}$;
$\therefore \frac{6}{11}$ of breadth $+ \frac{5}{11}$ of breadth $= \frac{5}{11}$ of $21 + \frac{5}{11}$ of breadth;
$\therefore \frac{6}{11}$ of breadth $= \frac{105}{11}$; $\therefore$ breadth $= 17\frac{1}{2}$ ft.

(12) Length $= \frac{144}{6\frac{3}{4}}$ in. $= \frac{144 \times 4}{27}$ in. $= \frac{64}{3}$ in. = 1 ft. $9\frac{1}{3}$ in.

(13) Area of paper $= \{(301\frac{1}{2} + 238\frac{1}{2}) \times 120\}$ sq. in.
$= (540 \times 120)$ sq. in.;
length of paper $= \frac{540 \times 120}{18}$ in. $= (30 \times 120)$ in.;
cost of paper $= \frac{30 \times 120 \times 3}{36}d. = 300d. =$ £1. 5*s.*

(14) Area of courtyard $= (124 \times 124)$ sq. ft.;
area of each stone $= \frac{2 \times 15\frac{1}{2}}{12}$ sq. ft. $= \frac{31}{12}$ sq. ft.;
$\therefore$ number of stones $= (124 \times 124) \div \frac{31}{12} = 5952$.

(15) Area of paper $= \{(30 + 24) \times 10\}$ sq. ft. = 540 sq. ft.;
length of paper $= (540 \div \frac{5}{2})$ ft. = 216 ft.;
cost of paper $= 216 \times 2\frac{1}{2}d. = 540d. =$ £2. 5*s.*

(16) Area of walls $= \{(42 + 30) \times 12\}$ sq. ft. = 864 sq. ft.;
deductions $= \{21 + 30 + (2 \times 69)\}$ sq. ft. = 189 sq. ft.;
length of paper $= \frac{864 - 189}{2\frac{1}{2}}$ ft. = 270 ft. = 90 yd.;
cost of paper $= (90 \times 9)d. =$ £3. 7*s.* 6*d.*

N.B.—The panelling is only 69 ft. in length, because there is no panelling for the 3 ft. of the door's width.

(17) Area of field = 245388 sq. yd.;
length of other side = $\frac{245388}{572}$ yd. = 429 yd.;
diagonal = $\sqrt{\{(572)^2 + (429)^2\}}$ yd. = $\sqrt{511225}$ yd.
= 715 yd.

(18) Area of each part = (440 × 215) sq. ft. = 94600 sq. ft.
= $10511\frac{1}{9}$ sq. yd.;
area covered by trees = {(900 × 20) + (430 × 20)} sq. ft.
= 26600 sq. ft. = $2955\frac{5}{9}$ sq. yd.

(19) Writing *length* for *measure of length in feet*, and *breadth* for *measure of breadth in feet*.
Area of walls = { (twice length + twice breadth) × 11 } sq. ft.;
area of walls = { (four times breadth + twice breadth) × 11 } sq. ft.;
area of walls = (66 times breadth) sq. ft.;
∴ 66 times breadth = 143 × 6;
∴ breadth = 13 ft., and ∴ length = 26 ft.;
∴ length of moulding = $\frac{13+13+26+26}{3}$ yd. = 26 yd.

(20) Area of walls = $\{(54\frac{2}{3} + 40) \times 12\frac{1}{2}\}$ sq. ft. = $\frac{3550}{3}$ sq. ft.;
area of ceiling = $(27\frac{1}{3} \times 20)$ sq. ft. = $\frac{1640}{3}$ sq. ft.;
∴ area to be painted = $\frac{5190}{3}$ sq. ft.;
∴ cost = $\frac{5190 \times 17}{9 \times 3 \times 2}$*d.* = $\frac{14705}{9}$*d.* = £6. 16*s.* $1\frac{8}{9}$*d.*

(21) Area of carpet = $(15\frac{3}{4} \times 13\frac{1}{3})$ sq. ft. = $\frac{63 \times 40}{4 \times 3}$ sq. ft.;
length of carpet = $\frac{63 \times 40 \times 12}{4 \times 3 \times 27}$ ft. = $\frac{7 \times 40}{3}$ ft. = $\frac{7 \times 40}{9}$ yd.;
cost of carpet = $\frac{7 \times 40 \times 9}{9 \times 2}$*s.* = £7.

(22) Area of carpet = $(10\frac{2}{3} \times 7\frac{1}{3})$ sq. yd. = $\frac{32 \times 22}{9}$ sq. yd.;
length of carpet = $\frac{32 \times 22 \times 4}{9 \times 3}$ yd.;
cost of carpet = $\frac{32 \times 22 \times 4 \times 9}{9 \times 3 \times 2}$*s.* = £23. 9*s.* 4*d.*

(23) Area of carpet = (11 × 8) sq. yd.;
length of carpet = $\frac{396}{3}$ yd. = 132 yd.;
∴ width of carpet = $\frac{11 \times 8}{132}$ yd. = $\frac{2}{3}$ yd. = 2 feet.

(24) Width of cloister = 4·15 yd.;
length to be paved = (45·77 + 8·3 + 45·77 + 8·3
+ 41·93 + 41·93) yd.;
area to be paved = (192 × 4·15) sq. yd.;
number of stones = $\frac{192 \times 4\cdot 15 \times 9}{5\cdot 76 \times 4\cdot 15}$ = $\frac{192}{\cdot 64}$ = 300.

Ex. (cxxviii), p. 235.

(1) Content = (8 × 7 × 6) c. ft. = 336 c. ft.

(2) Content = $(\frac{21}{2} \times \frac{33}{4} \times \frac{19}{3})$ c. ft. = $548\frac{5}{8}$ c. ft.

(3) Content = $(\frac{11}{2} \times \frac{17}{4} \times \frac{43}{12})$ c. ft. = $83\frac{73}{96}$ c. ft.

(4) Content = $(\frac{35}{3} \times \frac{59}{6} \times \frac{89}{12})$ c. ft. = $850\frac{185}{216}$ c. ft.

(5) Content = $(\frac{61}{3} \times \frac{127}{12} \times \frac{59}{12})$ c. ft. = $1058\frac{17}{432}$ c. ft.

(6) Content of wall = (75 × 12 × 6 × 12 × 18) c. in.;
content of a brick = (9 × $\frac{9}{2}$ × 3) c. in.;
∴ number of bricks = $\frac{75 \times 12 \times 6 \times 12 \times 18 \times 2}{9 \times 9 \times 3}$ = 9600.

(7) Cubic content of ice = (45 × 4840 × 9 × 144 × 3) c. in.;
weight of ice = $\frac{45 \times 4840 \times 9 \times 144 \times 3 \times 920}{1728}$ oz.;
= $\frac{45 \times 4840 \times 9 \times 144 \times 3 \times 920}{1728 \times 16 \times 112 \times 20}$ tons;
= $\frac{45 \times 605 \times 9 \times 23}{16 \times 28}$ tons = $12579\frac{183}{448}$ tons.

(8) In 1 month (800 × 500 × 40) c. yd. are dug by (4 × 500) men;
in 1 month 1 c. yd. is dug by $\frac{500 \times 4}{800 \times 500 \times 40}$ man;
in 5 months 1 c. yd. is dug by $\frac{1}{800 \times 10 \times 5}$ man;
in 5 months (1000 × 400 × 50) c. yd. are dug by
$\frac{1000 \times 400 \times 50}{800 \times 10 \times 5}$ men, or, 500 men.

(9) Area of side = $\frac{8664}{24}$ sq. in. = 361 sq. in.;
$\therefore$ length of edge = $\sqrt{361}$ in. = 19 in. = 1 ft. 7 in.

(10) Content of cistern = $(4 \times 2\frac{1}{2} \times 3\frac{1}{4})$ c. ft. = $\frac{5 \times 13}{2}$ c. ft.;
weight of water = $(5 \times 13 \times 500)$ oz. = $2031\frac{1}{4}$ lb.

(11) Content of stone = $(4 \times \frac{5}{2} \times \frac{5}{4})$ c. ft. = $\frac{25}{2}$ c. ft.;
$\therefore$ 1 c. ft. of the stone weighs $\frac{27 \times 2}{25}$ cwt.;
1 c. in. of the stone weighs $\frac{27 \times 2}{25 \times 1728}$ cwt.;
100 c. in. of the stone weigh $\frac{27 \times 2 \times 100}{25 \times 1728} = \frac{1}{8}$ cwt. = 14 lb.

(12) Contents of vessel weigh 166375 oz.;
$\therefore$ content of vessel = $\frac{166375}{1000}$ c. ft.;
$\therefore$ side of vessel = $\sqrt[3]{(166 \cdot 375)}$ ft. = $5 \cdot 5$ ft.

(13) In 42 days $(3 \times 440 \times 30 \times 7)$ c. yd. are dug by 120 men;
in 1 day 1 yd. is dug by $\frac{120 \times 42}{3 \times 440 \times 30 \times 7}$ men;
in 30 days $(1000 \times 36 \times \frac{22}{3})$ c. yd. are dug by
$\frac{120 \times 42 \times 1000 \times 12 \times 22}{3 \times 440 \times 30 \times 7 \times 3}$ men, that is by 160 men.

(14) 2520 lb. of liquid have for cubic content $(9 \times \frac{16}{3} \times \frac{9}{4})$ c. ft.;
1 lb. of liquid has for cubic content $\frac{9 \times 16 \times 9}{2520 \times 3 \times 4}$ c. ft.;
3850 lb. of liquid have for cubic content $\frac{9 \times 16 \times 9 \times 3850}{2520 \times 3 \times 4}$ c. ft.
= 165 c. ft.;
$\therefore$ depth of cistern = $\frac{165}{8 \times 5 \cdot 5}$ ft. = $\frac{30}{8}$ ft. = $3\frac{3}{4}$ ft.

(15) Cost of excavation = $(110 \times 6 \times \frac{1}{3})$*s.* = 220*s.*;
cost of rubble = $(110 \times 6 \times \frac{2}{9})$*s.* = 146*s.* 8*d.*;
cost of gravel = $(110 \times 6 \times \frac{1}{4}) \times \frac{5}{2}$*s.* = 412*s.* 6*d.*;
$\therefore$ whole cost = 779*s.* 2*d.* = £38. 19*s.* 2*d.*

EXAMINATION PAPERS.

Page 236.

(1) Twenty millions, one hundred and three thousand and seven; 19001006.

(2) 220015. (3) 42704 − 37859 = 4845.

(4)

$$\begin{array}{r} 7256 \\ 892 \\ \hline 14512 \\ 65304 \\ 58048 \\ \hline 6472352 \end{array} \qquad\qquad \begin{array}{r} 49382 \\ 375 \\ \hline 246910 \\ 345674 \\ 148146 \\ \hline 18518250 \end{array}$$

(5)

$$\begin{array}{rl} 532) & 173432\,(\,326 \\ & 1596 \\ \cline{2-2} & 1383 \\ & 1064 \\ \cline{2-2} & 3192 \\ & 3192 \\ \cline{2-2} \end{array} \qquad\qquad \begin{array}{rl} 340) & 2667640\,(\,7846 \\ & 2380 \\ \cline{2-2} & 2876 \\ & 2720 \\ \cline{2-2} & 1564 \\ & 1360 \\ \cline{2-2} & 2040 \\ & 2040 \\ \cline{2-2} \end{array}$$

(6) 225003010; nine hundred and ninety-nine millions, nine hundred and ninety thousand and ninety.

(7) 8000008 – 70077 = 7929931.

(8)

$$\begin{array}{r}
8649 \\
4237 \\
\hline
60543 \\
25947 \\
17298 \\
34596 \\
\hline
36645813
\end{array}
\qquad\qquad
\begin{array}{r}
7650 \\
389 \\
\hline
68850 \\
61200 \\
22950 \\
\hline
2975850
\end{array}$$

(9)

$$\begin{array}{l}
598\,)\,50222122\,(\,83983 \\
\underline{4784} \\
2382 \\
\underline{1794} \\
5881 \\
\underline{5382} \\
4992 \\
\underline{4784} \\
2082 \\
\underline{1794} \\
288
\end{array}
\qquad
\begin{array}{l}
40072\,)\,38871923744\,(\,970052 \\
\underline{360648} \\
280712 \\
\underline{280504} \\
208374 \\
\underline{200360} \\
80144 \\
\underline{80144}
\end{array}$$

(10) 58 – 23 = 35.

(11) 1250000 – 700921 = 549079.

(12)

$$\begin{array}{r|l}
9 & 436694 \\
\hline
6 & 48521 \text{ and 5 units over.} \\
\hline
 & 8086 \text{ and 5 parcels of 9 units over.}
\end{array}$$

∴ remainder is 5 + 45, or, 50.

(18) 5947) 5985 (1
5947
38) 5947 (156
38
214
190
∴ H. C. F. is 19.
247
228
19) 38 (2
38

(14) 869875
78946
5219250
3479500
7828875
6959000
6089125
68673151750

(15) 423) 39342154 (93007
3807
1272
1269
3154
2961
193

(16) 3500015
315005
59095
3874115
410382
3463733

9008010
8597628
410382

(17) 59 + 47 = 106.

(18) 1485) 4941 (3
4455
486) 1485 (3
1458
27) 486 (18
∴ 27 is H. C. F.
27
216
216

504) 5292 (1
504
252) 504 (2
504

252) 1520 (6
1512
8) 252 (31
24
12
8
4) 8 (2
∴ 4 is H. C. F.
8

(19) 4 | 48602728
12 | 12150682
2,0 | 1012556 . 10*d.*
£50627. 16*s.* 10*d.*

```
          £     s.    d.
(20)  19) 825 . 1 . 10¾ (£43
          76
          ——
           65
           57
           ——
            8
            20
            ——
           161 (8s.
           152
           ———
             9
            12
            ——
           118 (6d.
           114
           ———
             4
             4
             —
            19 (1q.
            19
            ——
```

```
(21)  2214) 2600509050 (1174575
            2214
            ————
             3865
             2214
             ————
             16510
             15498
             —————
              10129
               8856
              —————
               12730
               11070
               —————
                16605
                15498
                —————
                 11070
                 11070
                 —————
```

```
(23)  19527) 23667 (1
             19527
             —————
              4140) 19527 (4
                    16560
                    —————
                     2967) 4140 (1
                           2967
                           ————
                           1173) 2967 (2
                                 2346
                                 ————
                                  621) 1173 (1
                                       621
                                       ———
                                        552) 621 (
                                             552
                                             ———
                                              69) 552 (8
                                                  552
                                                  ———
```

∴ 69 is H. C. F.

```
          £     s.    d.
(22)     123 . 17 . 11¼
          20
        ————
        2477
          12
       —————
       29735
           4
      ——————
      118941
```

(24)

$$\begin{array}{r|l} & 42,\ 56,\ 126,\ 154 \\ \hline 7 & 56,\ 126,\ 154 \\ \hline 2 & 8,\ 18,\ 22 \\ \hline & 4,\ 9,\ 11 \end{array}$$

∴ L. C. M. = 14 × 36 × 11 = 5544.

(25) Smaller number + (smaller number + 16) = 148.
∴ twice the smaller number = 132.
∴ the smaller is 66 and the greater 82.

(26) $\frac{185}{333} = \frac{5 \times 37}{9 \times 37} = \frac{5}{9}$

$\frac{2772}{8064} = \frac{693}{2016} = \frac{77}{224} = \frac{11}{32}$

(27)

$$\begin{array}{r} 87 \\ 56 \\ \hline 522 \\ 435 \\ \hline 4872 \\ 409 \\ \hline 43848 \\ 19488 \\ \hline 1992648 \end{array}$$

(28)

$$\begin{array}{rcrcr} \pounds & & s. & & d. \\ 27 & . & 14 & . & 7\frac{1}{2} \\ & & & & 11 \\ \hline 305 & . & 0 & . & 10\frac{1}{2} \\ & & & & 7 \\ \hline \pounds 2135 & . & 6 & . & 1\frac{1}{2} \end{array}$$

(29)

$$\begin{array}{r|l} & 9,\ 12,\ 18,\ 30,\ 48,\ 60 \\ \hline 6 & 18,\ 48,\ 60 \\ \hline 2 & 3,\ 8,\ 10 \\ \hline & 3,\ 4,\ 5 \end{array}$$

∴ L. C. M. = 12 × 60 = 720.

(30)

$$\begin{array}{r|l} 12 & 900000000 \\ \hline 2{,}0 & 7500000{,}0 \\ \hline & \pounds 3750000 \end{array}$$

(31)

$$\begin{array}{r} 70700007 \\ 1200678 \\ \hline 71900685 \\ 90000 \\ \hline 71810685 \end{array}$$

(32)

$$\begin{array}{r} 43 \\ 35 \\ \hline 215 \\ 129 \\ \hline 1505 \end{array}$$

```
(33)  11431 ) 12006 ( 1
              11431
              -----
                575 ) 11431 ( 19
                      575
                      ----
                      5681
                      5175
                      ----
                       506 ) 575 ( 1
                             506
                             ---
                              69 ) 506 ( 7
∴ 23 is H. C. F.                   483
                                   ---
                                    23 ) 69 ( 3
                                         69
                                         --
```

```
(34)   | 1, 2, 3, 4, 5, 6, 7, 8, 9
       |--------------------------
     2 |             5, 6, 7, 8, 9
       |--------------------------
     3 |             5, 3, 7, 4, 9
       |--------------------------
       |             5, 1, 7, 4, 3

∴ L. C. M. = 6 × 35 × 12 = 2520.
```

```
          £       s.    d.
(35)  14789  .  19  .  11¾
         20
     ------
     295799
         12
    -------
    3549599
          4
   --------
   14198399
```

(36) $\frac{24352}{39624} = \frac{6088}{9906} = \frac{3044}{4953}$

$\frac{4}{51} \times \frac{3}{64} \times \frac{340}{25} = \frac{4 \times 3 \times 17 \times 20}{3 \times 17 \times 64 \times 25} = \frac{20}{16 \times 25} = \frac{1}{20}.$

```
                                  79000000 ) 207184147568oo ( 262258
                                             158000000
                                             ---------
(37)      563000401                           491841475
              36800                           474000000
      -------------                           ---------
      4504003208oo                             178414756
     3378002406                                158000000
    1689001203                                 ---------
    ---------------                             204147568
    207184147568oo                              158000000
                                                ---------
                                                 461475680
                                                 395000000
                                                 ---------
                                                  664756800
                                                  632000000
                                                  ---------
                                                   32756800
```

(38)
$$\begin{array}{r}
\pounds \quad s. \quad d. \\
2\ .\ 13\ .\ 4 \\
3 \\
\hline
8\ .\ 0\ .\ 0 \\
5 \\
\hline
\pounds 40\ .\ 0\ .\ 0
\end{array}$$

(39)
$$\begin{array}{r|l}
 & \pounds \quad s. \quad d. \\
4 & 17\ .\ 13\ .\ 4 \\
\hline
5 & 4\ .\ 8\ .\ 4 \\
\hline
 & \quad 17\ .\ 8
\end{array}$$

(40)
$$\begin{array}{r|l}
5 & 436694 \\
\hline
7 & 87338 \text{ and 4 units over.} \\
\hline
 & 12476 \text{ and 30 units over.}
\end{array}$$

(41)
$$\begin{array}{r|l}
 & d. \\
 & 365 \\
 & 8\frac{1}{2} \\
\hline
 & 2920 \\
 & 182\frac{1}{2} \\
\hline
12 & 3102\frac{1}{2} \\
\hline
2{,}0 & 25{,}8 \quad 6\frac{1}{2}d. \\
\hline
 & \pounds 12.\ 18s.\ 6\frac{1}{2}d.
\end{array}$$

(42) $\frac{1}{2} + \frac{3}{4} + \frac{7}{8} = \frac{4+6+7}{8} = \frac{17}{8} = 2\frac{1}{8}$.

(43) $\pounds 2.\ 10s. + 12s.\ 6d. + 5s. + 5d. = \pounds 3.\ 7s.\ 11d. = 3260q.$

(44) $\frac{\pounds 275.\ 15s.\ 1\frac{1}{2}d.}{18} = \frac{\pounds 91.\ 18s.\ 4\frac{1}{2}d.}{6} = \pounds 15.\ 6s.\ 4\frac{3}{4}d.$

(45) $12000 + 1200 + 12 = 13212$

$$\begin{array}{r}
13212 \\
1777 \\
\hline
92484 \\
92484 \\
92484 \\
13212 \\
\hline
23477724
\end{array}$$

Twenty-three millions, four hundred and seventy-seven thousand, seven hundred and twenty-four.

(46) $40200 - 37601 = 2599$;
$2599 \div 23 = 113$.

(47) $\frac{12}{13}$ of $\frac{84175}{99900} = \frac{6475}{8325} = \frac{1295}{1665} = \frac{7}{9}$.

(48) $\frac{1}{5} + 13\frac{3}{10} + \frac{94}{35} = 13 + \frac{14+21+188}{70} = 16\frac{13}{70}$.

(49)

£ . s. . d.
961 . 4 . $5\frac{3}{4}$
5
4806 . 2 . $4\frac{3}{4}$
7
£33642 . 16 . $9\frac{1}{4}$

£ . s. . d.
5 | 961 . 4 . $5\frac{3}{4}$
7 | 192 . 4 . $10\frac{3}{4}$
£27 . 9 . $3\frac{1}{4}$

(50)

oz.
4 | 8795342
4 | 2198835 . 2 } 14 oz.
4 | 549708 . 12 }
7 | 137427
4 | 19632 . 12 lb.
2,0 | 490,8
245 tons 8 cwt.

(51)

6 × 20 × 42 × 72 = 362880

3 | 362880
5 | 120960
7 | 24192
3456

(52) He gains 6*d.* on each yard;

∴ his profit was 500 × 6*d.* = £12. 10*s.*

(53)

372) 837 (2
744
93) 372 (4
372

∴ H. C. F. is 31.

93) 248 (2
186
62) 93 (1
62
31) 62 (2
62

$$\frac{7}{9} = \frac{7\times13\times29}{9\times13\times29} = \frac{2639}{9\times13\times29};$$

$$\frac{11}{13} = \frac{11\times9\times29}{9\times13\times29} = \frac{2871}{9\times13\times29};$$

$$\frac{24}{29} = \frac{24\times9\times13}{9\times13\times29} = \frac{2808}{9\times13\times29};$$

∴ the decreasing order is

$\frac{11}{13}$, $\frac{24}{29}$, $\frac{7}{9}$.

(54)

21·945
5·08
175560
109725
·381) 111·48060 (292·6
762
3528
3429
990
762
2286
2286

(55) $\frac{£9.\ 17s.\ 8\frac{1}{2}d.}{365} = \frac{£1.\ 19s.\ 6\frac{1}{2}d.}{73} = 6\frac{1}{2}d.$

(56)

7 cwt. 3 qr. 24 lb.		oz.
4	4	7805491
31 qr.	4	1951372 . 3 oz.
28	4	487843
272	7	121960 . 3 } 27 lb.
62	4	17422 . 24 }
892 lb.	2,0	435,5 . 2 qr.
16		
14272 oz.		217 tons 15 cwt.

(57)

£	s.	d.	
35	17	$4\frac{1}{2}$	
		10	
358	13	9	for 10
		10	
3586	17	6	for 100
		3	
10760	12	6	for 300
358	13	9	for 10
179	6	$10\frac{1}{2}$	for 5
£11298	13	$1\frac{1}{2}$	for 315

(58) $7816 \div 325\frac{2}{3} = \frac{7816\times 3}{977} = 24.$

(59) $6 + \frac{11}{12} + \frac{17}{16} + \frac{59}{60} + \frac{47}{48} + \frac{59}{60}$

$= 6 + 1 - \frac{1}{12} + 1 + \frac{1}{16} + 1 - \frac{1}{60} + 1 - \frac{1}{48} + 1 - \frac{1}{60}$

$= 11 - \frac{2}{48} - \frac{2}{60} = 11 - \frac{1}{24} - \frac{1}{30} = 10\frac{37}{40}.$

(60)

$$\begin{array}{r} 1\cdot000 \\ \cdot979 \\ \hline \cdot021 \end{array}$$

(61) **107020060; twenty-one millions six hundred and thirty-seven thousand, and thirty-seven.**

(62)

$$\begin{array}{r|rcrcr} & £ & & s. & & d. \\ 7 & 23596 & . & 11 & . & 8\frac{1}{4} \\ \hline 9 & 3370 & . & 18 & . & 9\frac{3}{4} \\ \hline & £374 & . & 10 & . & 11\frac{3}{4} \end{array}$$

(63)

$$\begin{array}{r} 3{\cdot}073 \\ 3{\cdot}15 \\ \hline 15365 \\ 3073 \\ 9219 \\ \hline \end{array}$$

$$\begin{array}{rl} 131{\cdot}7\,) & 9{\cdot}67995\,(\,{\cdot}0735 \\ & 9219 \\ \hline & 4609 \\ & 3951 \\ \hline & 6585 \\ & 6585 \\ \hline \end{array}$$

(64) He spends $\frac{7}{365}$ of £561. 3*s*. 9*d*.

or $\frac{7\times(£112.\ 4s.\ 9d.)}{73}$

or 7 × (£1. 10*s*. 9*d*.), or, £10. 15*s*. 3*d*.

(65) Length of pace in inches $= \frac{3\frac{3}{4}\times 1760\times 36}{7920}$

$= \frac{15\times 176\times 4}{88\times 4} = 30.$

(66)

$$\begin{array}{rcrcrl} £ & & s. & & d. & \\ 35 & . & 4 & . & 2 & \\ & & & & 10 & \\ \hline 352 & . & 1 & . & 8 & \text{for } 10 \\ & & & & 10 & \\ \hline 3520 & . & 16 & . & 8 & \text{for } 100 \\ & & & & 2 & \\ \hline 7041 & . & 13 & . & 4 & \text{for } 200 \\ 2112 & . & 10 & . & 0 & \text{for } 60 \\ 35 & . & 4 & . & 2 & \text{for } 1 \\ \hline £9189 & . & 7 & . & 6 & \text{for } 261 \end{array}$$

$$\begin{array}{rrcrcrl} & £ & & s. & & d. & \\ & 9189 & . & 7 & . & 6 & \\ & 9089 & . & 5 & . & 0 & \\ \hline 89\,) & 100 & . & 2 & . & 6 & (£1 \\ & 89 & & & & & \\ \hline & 11 & & & & & \\ & 20 & & & & & \\ \hline & 222 & (2s. & & & & \\ & 178 & & & & & \\ \hline & 44 & & & & & \\ & 12 & & & & & \\ \hline & 534 & (6d. & & & & \\ & 534 & & & & & \\ \hline \end{array}$$

(67) $\frac{1 \text{ ton } 17 \text{ lb.}}{16} = \frac{5 \text{ cwt. } 4 \text{ lb. } 4 \text{ oz.}}{4} = 1 \text{ cwt. } 1 \text{ qr. } 1 \text{ lb. } 1 \text{ oz.}$

(68) $960 + 480 + 120 + 1 = 1561$, and $9366 \div 1561 = 6$.

(69) $\frac{1}{8} + \frac{29}{16} + (\frac{5}{16} - \frac{1}{4}) = \frac{31}{16} + \frac{1}{16} = \frac{32}{16} = 2.$

(70) $\frac{126000}{21} = 6000$; $\frac{\cdot 126}{210} = \cdot 0006.$

(71) $10000 \times 20 \times 4 \times 28$ lb. = 22400000 lb.

	lb.
4	10000
7	2500 . 4 lb.
4	357 . 1 qr.
2,0	8,9

4 tons 9 cwt.

(72)

ac.	ro.	po.
275	3	21
56	2	12
187	1	0
99	0	33
	2	20
619	2	6

(73)

£	s.	d.	
546	10	$9\frac{1}{2}$	
		12	
6558	9	6	for 12.
		12	
78701	14	0	for 144
546	10	$9\frac{1}{2}$	for 1
78155	3	$2\frac{1}{2}$	for 143

Since $71\frac{1}{2} = \frac{143}{2}$;

(£546. 10*s.* $9\frac{1}{2}$*d.*) $\times \frac{143}{2}$;

= £39077. 11*s.* $7\frac{1}{4}$*d.*

(74) He sells them for (48 × 10)*s.*, or, £24. ;
∴ he gains £(24 − 20), or, £4.

(75) $\frac{1}{15} + \frac{1}{35} + \frac{1}{24} + \frac{1}{48} + \frac{1}{63} = \frac{7+3}{105} + \frac{2+1}{48} + \frac{1}{63}$
$= \frac{2}{21} + \frac{1}{16} + \frac{1}{63} = \frac{7}{63} + \frac{1}{16} = \frac{1}{9} + \frac{1}{16} = \frac{25}{144}.$

(76)
$$\begin{array}{cccccc}
\text{ac.} & \text{ro.} & \text{po.} & \text{yd.} & \text{ft.} & \text{in.} \\
1\ . & 1\ . & 1\ . & 1\ . & 1\ . & 1 \\
 & & & & & 6 \\ \hline
7\ . & 2\ . & 6\ . & 6\ . & 6\ . & 6 \\
 & & & & & 5 \\ \hline
37\ . & 2\ . & 31\ . & 2\frac{3}{4}\ . & 3\ . & 30
\end{array}$$

(77) $\frac{\cdot 14}{7} = \cdot 02$

$\frac{140}{\cdot 07} = \frac{14000}{7} = 2000$

$\frac{\cdot 014}{7000} = \cdot 000002$

$\therefore$ sum $= 2000\cdot 020002 = \frac{2000020002}{1000000} = \frac{1000010001}{500000}$.

(78) He spends $\frac{365}{7}$ of £10. 11*s.* 9*d.*, or, 365 × { £1. 10*s.* 3*d.* }, or, £552. 1*s.* 3*d.*

(79)
$$\begin{array}{r|l}
 & \quad\text{ft.} \\
3 & 41707796 \\ \hline
5\frac{1}{2} & 13902598\ .\ 2\text{ ft.} \\
2 & \qquad\quad 2 \\ \hline
11 & 27805196 \\ \hline
4{,}0 & 252774{,}5\ .\ 1\text{ ft. }6\text{ in.} \\ \hline
8 & 63193\ \ .\ 25\text{ po.} \\ \hline
 & 7899\text{ mi. }1\text{ fur.}
\end{array}$$

(80)
$$\begin{array}{r|cccc}
 & \text{tons} & \text{cwt.} & \text{qr.} & \text{lb.} \\
9 & 54\ . & 19\ . & 3\ . & 27 \\ \hline
8 & 6\ . & 2\ . & 0\ . & 24\frac{7}{9} \\ \hline
 & & 15\ . & 1\ . & 3\frac{7}{72}
\end{array}$$

(81)
$$\begin{array}{l}
228\ )\ 304\ (\ 1 \\
\qquad\ \ 228 \\
\qquad\ \ \overline{} \\
\qquad 76\ )\ 228\ (\ 3 \\
\qquad\qquad\ \ 228 \\
\qquad\qquad\ \ \overline{}
\end{array}
\qquad\qquad
\begin{array}{l}
76\ )\ 342\ (\ 4 \\
\qquad 304 \\
\qquad \overline{} \\
\quad 38\ )\ 76\ (\ 2 \\
\qquad\quad\ 76 \\
\qquad\quad\ \overline{}
\end{array}$$

$\therefore$ 38 is the H. C. F.

$$\begin{array}{r|ccc}
38 & 228, & 304, & 342 \\ \hline
3 & 6, & 8, & 9 \\ \hline
2 & 2, & 8, & 3 \\ \hline
 & 1, & 4, & 3
\end{array}$$

$\therefore$ L. C. M. $= 38 \times 72 = 2736$.

(82) 320009009; ninety-nine thousand and two hundred-millionths.

(83) The train passes over 22 yards in a second;
$\therefore$ it runs at the rate of $\frac{22\times60\times60}{1760}$ mi., or, 45 miles an hour.

(84) $\frac{\cdot24}{\cdot012} = \frac{240}{12} = 20$
$\frac{240}{\cdot12} = \frac{24000}{12} = 2000$
$\frac{\cdot024}{120} = \cdot0002.$

(85) $\frac{5}{8} + \frac{42}{75} = \frac{375+336}{600} = 1\frac{37}{200}$
$\frac{5}{8} - \frac{42}{75} = \frac{375-336}{600} = \frac{13}{200}$
$\frac{5}{8} \times \frac{42}{75} = \frac{21}{4\times15} = \frac{7}{20}.$

(86)
```
78489 ) 648720 ( 8
        627912
        ------
         20808 ) 78489 ( 3
                 62424
                 -----
                 16065 ) 20808 ( 1
                         16065
                         -----
                          4743 ) 16065 ( 3
                                 14229
                                 -----
                                  1836 ) 4743 ( 2
                                         3672
                                         ----
                                         1071 ) 1836 ( 1
                                                1071
                 ------------------------------------
                 765 ) 1071 ( 1                  765
                       765
                       ---
                       306 ) 765 ( 2
                             612
                             ---
                             153 ) 306 ( 2
                                   306
                                   ---
```
H. C. F. is 153.

(87) $7\cdot\dot{5}\dot{7} \times \cdot3\dot{6} = \frac{750}{99} \times \frac{33}{90} = \frac{25}{9}$
$2\cdot3\dot{4}\dot{5} = \frac{2322}{990} = \frac{258}{110} = \frac{129}{55}$
$\therefore$ result $= \frac{25}{9} - \frac{129}{55} = \frac{214}{495} = \cdot4\dot{3}\dot{2}.$

(88) $\frac{1323}{61} = 21\frac{42}{61}.$

(89) In 12 months he spends 2 × (£250. 10*s.*) = £501 ;
in 12 months he spends 3 × (£125. 5*s.*) = £375. 15*s.* ;
∴ he lays by £501 − £375. 15*s.*, or, £125. 5*s.*

(90) $1080 + \frac{2}{5} + \frac{5}{9} + \frac{2}{45} = 1080 + \frac{45}{45} = 1081$
$1081 - 81\frac{7}{12} = 1000 - \frac{7}{12} = 999\frac{5}{12}$.

(91) $\frac{76\cdot57}{\cdot0019} = \frac{765700}{19} = 40300$
$\frac{3}{7}$ of $\cdot0008568 = 3 \times \cdot0001224 = \cdot0003672$
$40300 \times \cdot0003672 = 14\cdot79816$.

(92) $\cdot0075 = \frac{75}{10000} = \frac{15}{2000} = \frac{3}{400}$
$\cdot1\dot{3}\dot{6} = \frac{135}{990} = \frac{15}{110} = \frac{3}{22}$
$\cdot\dot{0}0\dot{9} = \frac{9}{999} = \frac{1}{111}$.

(93) Annual cost = 36 × (£1 + 3*s.* 4*d.* + 2*s.* $2\frac{2}{3}$*d.* + 1*s.* 4*d.*)
= 36 × (£1. 6*s.* $10\frac{2}{3}$*d.*) = £48. 8*s.*

(94) Number of steps = $\frac{4\frac{3}{4} \times 1760 \times 36}{32} = \frac{19 \times 1760 \times 9}{32} = 9405$.

(95)
```
 cwt.  qr.  lb.  oz.
  17 . 3 . 15 . 8
   4
 ----
  71
  28
 ----
  583
  142
 -----
  2003
    16
 ------
  32056
     16
 -------
 192336
 32056
 -------
 5128096
```

(96) One gets 4 parts when the other gets 3 parts, and we must therefore divide the sum into 7 equal parts, each of which will be £1. 0*s.* $11\frac{1}{4}$*d.*, and give 4 parts, or, £4. 3*s.* 9*d.*, to one, and 3 parts, or, £3. 2*s.* $9\frac{3}{4}$*d.*, to the other.

(97) $\frac{41}{162} - \frac{3}{54} - \frac{9}{49} = \frac{32}{162} - \frac{9}{49} = \frac{55}{3969}$

$\frac{4}{9} + \frac{1}{2} - \frac{3}{14} = \frac{4}{9} + \frac{4}{14} = \frac{46}{63}$

$\frac{55}{3969} \div \frac{46}{63} = \frac{55 \times 63}{3969 \times 46} = \frac{55}{63 \times 46} = \frac{55}{2898}$.

```
2898 ) 55·0000 ( ·0189
       2898
       ----
       26020
       23184
       -----
        28360
        26082
        -----
         2278
```

(98)

```
        238·7
         14·1
        -----
         2387
        9548
       2387
       ------
1·023 ) 3365·67 ( 3290
        3069
        ----
         2966
         2046
         ----
          9207
          9207
          ----
```

(99) He spends in a day $\frac{£26\ 8s.}{30}$, or, $\frac{£4\ 8s.}{5}$;

∴ in 365 days he spends 73 × (£4. 8*s*.), or, £321. 4*s*.;

∴ he saves £78. 16*s*.

(100) $\frac{12}{9} \times (\frac{22}{9} + \frac{68}{9}) = \frac{12}{9} \times \frac{90}{9} = \frac{40}{3}$

$\frac{2341}{990} - \frac{1681}{990} = \frac{660}{990} = \frac{66}{99} = \frac{2}{3}$

$\frac{40}{3} + \frac{2}{3} = \frac{42}{3} = 14$.

	tons	cwt.	qr.	lb.	oz.	dr.
(101)	3	11	3	27	8	4

20
71
4
287
28
2323
574
8063
16
129016
16
2064260

(102) *A*'s money = £1529 − £400 = £1129.

(103)
128) 384 (3
384

128) 768 (6
768

∴ H. C. F. is 128.

128) 2304 (18
128
1024
1024

Hence L. C. M. = 128 × 18 = 2304.

(104)
1|52|39|90|25 (12345
1
22 | 52
44
243 | 839
729
2464 | 11090
9856
24685 | 123425
123425

(105) He gets on an average 5*d.* a week;
∴ he gets (5 × 4 × 39)*d.*, or, £3. 5*s.*

$$\begin{array}{r}
625\,)\,75445\cdot000\,(\,120\cdot712 \\
625 \\
\hline
1294 \\
1250 \\
\hline
4450 \\
4375 \\
\hline
750 \\
625 \\
\hline
1250\, \\
1250\, \\
\hline
\end{array}$$

(106)

$$\begin{array}{r}
\cdot5678 \\
\cdot08765 \\
\hline
28390 \\
34068 \\
39746 \\
45424 \\
\hline
\cdot049767670
\end{array}$$

(107)

	£	s.	d.	
4s. = $\frac{1}{5}$ of £1	164	0	0	= cost at £1 each.
4s. = $\frac{1}{5}$ of £1	32	16	0	= ...... 4s. ....
4d. = $\frac{1}{12}$ of 4s.	32	16	0	= ...... 4s. ....
1d. = $\frac{1}{4}$ of 4d.	2	14	8	= ...... 4d. ....
$\frac{1}{2}$d. = $\frac{1}{2}$ of 1d.		13	8	= ...... 1d. ....
		6	10	= ...... $\frac{1}{2}$d. ....
	£233	7	2	= cost at £1. 8s. $5\frac{1}{2}$d. each.

(108) 11 ro. 11 po. 11 yd. = 451 po. 11 yd. = $13653\frac{3}{4}$ yd. = $122883\frac{3}{4}$ ft. = 17695260 in.; also, fraction

$$= \frac{13653\frac{3}{4}}{3\times4840} = \frac{54615}{3\times4840\times4} = \frac{1655}{440\times4} = \frac{331}{352}.$$

(109)

$$\begin{array}{r}
\text{mi.} \\
\cdot1215625 \\
1760 \\
\hline
72937500 \\
8509375 \\
1215625 \\
\hline
213\cdot9500000 \text{ yds.} \\
36\phantom{00000000 \text{ yds.}} \\
\hline
128370\phantom{0000 \text{ yds.}} \\
64185\phantom{00000 \text{ yds.}} \\
\hline
7702\cdot20 \text{ in.}
\end{array}$$

(110)

$$\begin{array}{r}
41\,)\,6892\cdot1\,(\,168\cdot1 \\
41 \\
\hline
279 \\
246 \\
\hline
332 \\
328 \\
\hline
41 \\
41 \\
\hline
\end{array}$$

$\cdot\dot{1}4285\dot{7} = \frac{142857}{999999} = \frac{1}{7}$

$\cdot\dot{0}7692\dot{3} = \frac{76923}{999999} = \frac{1}{13}$

$\frac{1}{7} \times \frac{1}{13} = \frac{1}{91} = \cdot\dot{0}1098\dot{9}$.

(111) We have to find the L. C. M. of 27 × 12 and 50, which is 27 × 12 × 25; and (27 × 12 × 25)*d.*, i.e., (27 × 6) dollars, or, 162 dollars is the debt required.

(112) The whole amount of their remaining money is £13. 7*s.* 3*d.*, and hence each of the three ought to have £4. 9*s.* 1*d.*;

∴ *A* has to hand over to *C* £7. 3*s.* 6*d.* − £4. 9*s.* 1*d.*, or, £2. 14*s.* 5*d.*;

∴ *B* has to hand over to *C* £4. 10*s.* − £4. 9*s.* 1*d.* or, 11*d.*

(113) $\frac{1}{6} + \frac{3}{10} + \frac{4}{15} + \frac{1}{35} = \frac{35+63+56+6}{210} = \frac{16}{21}$;

$\frac{3}{14} - \frac{4}{7} + \frac{15}{8} = \frac{12-32+105}{56} = \frac{117-32}{56} = 1\frac{29}{56}$.

(114) $\frac{5 \times 42}{6}s. = 35s.$, and $\frac{3 \times 80}{4}d. = 5s.$;

∴ fraction $= \frac{35-5}{60} = \frac{30}{60} = \frac{1}{2}$.

(115)
$$\begin{array}{r|l}
 & 5|31|11|81|16\ (\,23046 \\
 & 4 \\
\hline
43 & 131 \\
 & 129 \\
\hline
4604 & 21181 \\
 & 18416 \\
\hline
46086 & 276516 \\
 & 276516 \\
\hline
\end{array}$$

(116)

	£	s.	d.	
	1 .	13 .	4	= cost of 1 cwt.
			10	
	16 .	13 .	4	= . . . . . . 10 cwt.
			10	
	166 .	13 .	4	= . . . . . . 100 cwt.
	116 .	13 .	4	= . . . . . . 70 cwt.
	8 .	6 .	8	= . . . . . . 5 cwt.
14lb. = $\frac{1}{8}$ of 1 cwt.	291 .	13 .	4	= . . . . . . 175 cwt.
8oz. = $\frac{1}{28}$ of 14lb.		4 .	2	= . . . . . . 14 lb.
4oz. = $\frac{1}{2}$ of 8 oz.			$1\frac{11}{14}$	= . . . . . . 8 oz.
			$\frac{25}{28}$	= . . . . . . 4 oz.
	£291 .	17 .	$8\frac{19}{28}$	= cost of 175 cwt. 14 lb. 12 oz.

(117) £17. 9*s.* $8\frac{1}{4}$*d.* = 16785*q.*; and £1. 18*s.* $10\frac{1}{4}$*d.* = 1865*q.*;
∴ number of yards = $\frac{1865 \times 45}{16785} = \frac{45}{9} = 5$.

(118) $\frac{\cdot 000918}{\cdot 017} = \frac{9 \cdot 18}{17} = 54$; $\frac{\cdot 000918}{170} = \cdot 000054$.

(119)

£	s.	d.
37	18	$2\frac{3}{4}$
		9
341	4	$0\frac{3}{4}$
		9
3070	16	$6\frac{3}{4}$
18	19	$1\frac{3}{8}$
3089	15	$8\frac{1}{8}$

(120)
10203509
9856007

20059516 sum
347502 difference

19712014

(121) Number of pins = 20000 × 20 × 112 × 16 × 200
= 143360000000.

(122)
14·94
·0093
100·
26·005

140·9543

$\frac{\cdot 025075}{1 \cdot 003} = \frac{25 \cdot 075}{1003} = \cdot 025$

·025 × 1000 = 25.

(123)

		cwt.	qr.	lb.	oz.
$\frac{3}{5}$ of a ton	=	12	0	0	0
$\frac{5}{8}$ of a cwt.	=		2	14	0
$\frac{2}{3}$ of a lb.	=				$10\frac{2}{3}$
		12	2	14	$10\frac{2}{3}$

12 | 6·75
30 | 51·5625
1·71875

(124)

	£	s.	d.	
	4	10	0	= cost of 1 cwt.
			5	
2 qr. = $\frac{1}{2}$ of 1 cwt.	22	10	0	= cost of 5 cwt.
14 lb. = $\frac{1}{4}$ of 2 qr.	2	5	0	= ...... 2 qr.
7 lb. = $\frac{1}{2}$ of 14 lb.		11	3	= ...... 14 lb.
		5	$7\frac{1}{2}$	= ...... 7 lb.
	£25	11	$10\frac{1}{2}$	= cost of 5 cwt. 2 qr. 21 lb.

```
(125)          74'68'·41'64 ( 86·42
               64
               ──
       166     1068
                996
              ─────
      1724      7241
                6896
              ──────
     17282      34564
                34564
              ───────
```

(126) If 8 oz. be worth ·5625*s.*;
1 lb. is worth (·5625 × 2)*s.*, or, 1·125*s.*, or, $1\frac{1}{8}$*s.*;
∴ 1 cwt. is worth $\frac{9\times112}{8}$*s.*, or, 126*s.*;
∴ ·75 of ton, that is 15 cwt., is worth (126 × 15)*s.*, or, £94. 10*s.*

(127) 247131012; one billion two hundred and forty-seven thousand six hundred and eighty-one millions three hundred and fifty-four thousand two hundred and eleven.

(128) 5 cwt. 3 qr. 18 lb. 8 oz. = 10600 oz.;
12 cwt. 2 qr. 14 lb. 6 oz. = 22630 oz.
∴ cost in pence $= \frac{5850\times22630}{10600}$*d.* $= \frac{1323855}{100}$*d.* $= 12489\frac{21}{100}$*d.*
$= £52.\ 0s.\ 9\frac{21}{100}d.$

(129) $\left(\frac{7}{3} + \frac{4\times10\times2}{5\times3\times4} - \frac{5}{2}\right) + \frac{55}{5\times6} = \frac{11}{6} \times \frac{6}{11} = 1.$

```
(130)  ·024          525 ) 249900 ( 476           d.
       1·04                2100                 1·045
       ────                ────                  1290
         96                 3990                ─────
       24                   3675                94050
     ──────                 ────               2090
     ·02496                  3150             1045
                             3150            ───────
                             ────         d. 1348·050
                                         = £5. 12s. 4·05d.
```

(131) $\frac{2\times4\times5\times9}{3\times5\times3\times16}$ of £2. 5*s*. 6*d*. = $\frac{1}{2}$ of £2. 5*s*. 6*d*. = £1. 2*s*. 9*d*.

(132) $\frac{3}{10}$ of the ship costs £4000;
∴ the ship costs £$\frac{40000}{3}$;
∴ $\frac{3}{40}$ of the ship costs £$\frac{3\times40000}{40\times3}$, or, £1000.

(133) In 1 hour the work is done by (24 × 12 × 10) men; in 80 hours the work is done by $\frac{24\times12\times10}{80}$ men, or, 36 men;
∴ (3 × 36) men, or, 108 men will be required.

(134) $\frac{(\frac{10}{3}-\frac{5}{2})+\frac{5}{16}}{\frac{8}{3}+\frac{3}{4}} = \frac{\frac{5}{6}\times\frac{16}{5}}{\frac{32}{9}} = \frac{8\times9}{3\times32} = \frac{3}{4} = \cdot75.$

(135) $\frac{\cdot3\times147}{\cdot0000015} = \frac{3\times147000000}{15} = 29400000.$

(136)

		s.	*d*.
$\frac{5}{9}$ of 21*s*. = $\frac{35}{3}$*s*. =		11	8
$\frac{3}{16}$ of 20*s*. = $\frac{15}{4}$*s*. =		3	9
$\frac{5}{8}$ of 12*d*. = $\frac{15}{2}$*d*. =			$7\frac{1}{2}$
	s.	16	$0\frac{1}{2}$

(13.,

	£ . *s*. . *d*.	
	2 . 17 . 6	= cost of 1 cwt.
	12	
2 qr. = $\frac{1}{2}$ of 1 cwt.	34 . 10 . 0	= cost of 12 cwt.
1 qr. = $\frac{1}{2}$ of 2 qr.	1 . 8 . 9	= …… 2 qr.
14 lb. = $\frac{1}{2}$ of 1 qr.	14 . $4\frac{1}{2}$	= …… 1 qr.
2 lb. = $\frac{1}{7}$ of 14 lb.	7 . $2\frac{1}{4}$	= …… 14 lb.
	1 . $0\frac{9}{28}$	= …… 2 lb.
	£37 . 1 . $4\frac{1}{14}$	= cost of 12 cwt. 3 qr. 16 lb

(138) $\frac{3}{10}$ of the estate is worth £450. 15*s*.;
∴ the estate is worth $\frac{10\times(£450\ 15s.)}{3}$;
∴ ·48 of the estate is worth $\frac{48\times10\times(£450\ 15s.)}{100\times3}$ = £721. 4*s*.

(139) 2 qr. $16\frac{4}{5}$ lb. = $72\frac{4}{5}$ lb.;
∴ fraction = $\frac{72\frac{4}{5}}{112} = \frac{364}{5\times112} = \frac{13}{20} = \cdot65.$
Also, since 1 ton costs $\frac{100}{13}\times52s.$ = £20;
∴ ·65 of $\frac{1}{20}$ of 1 ton costs £$\frac{20\times65}{20\times100}$ = 13*s*.

(140) $\frac{\frac{5}{4}-\frac{5}{12}}{\frac{5}{4}+\frac{5}{12}}+\frac{7\times9\times5}{6\times14\times3}-\frac{45}{4\times15}=\frac{10}{20}+\frac{5}{4}-\frac{3}{4}=1$;

$\frac{2622}{3381}=\frac{874}{1127}=\frac{23\times38}{23\times49}=\frac{38}{49}$.

(141) $24\cdot0025=\frac{240025}{10000}=\frac{48005}{2000}=\frac{9601}{400}$;

$\cdot0008125=\frac{8125}{10000000}=\frac{1625}{2000000}=\frac{65}{80000}=\frac{13}{16000}$;

$\frac{1\cdot1214}{5\cdot34}=\frac{112\cdot14}{534}=\cdot21$;

$\frac{1121\cdot4}{\cdot534}=\frac{1121400}{534}=2100$.

(142)

£·875	cr. ·75	*s.* 1·625
20	5	12
s. 17·500	*s.* 3·75	*d.* 7·500
12	12	4
d. 6·000	*d.* 9·00	*q.* 2·000

∴ 17*s.* 6*d.* + 3*s.* 9*d.* − 1*s.* 7½*d.* = 19*s.* 7½*d.*;
then since 19*s.* 7½*d.* = 235·5*d.*;
and £1. 2*s.* 6*d.* = 270*d.*;
∴ fraction = $\frac{235\cdot5}{270}=\frac{7\cdot85}{9}=\cdot87\dot{2}$.

(143) The shares, commencing with a seaman's, are as 1, 3, 10;
then (15 + 3 + 10) seamen's share = £399. 7*s.*;
∴ a seaman's share = $\frac{\text{£}399.\ 7s.}{28}$ = £14. 5*s.* 3*d.*;
∴ the gunner's share = £42. 15*s.* 9*d.*;
∴ the lieutenant's share = £142. 12*s.* 6*d.*

(144)

	£	*s.*	*d.*	
		7 .	9	= value of 1 oz.
			6	
10 dwt. = ½ of 1 oz.		46 .	6	= value of 6 oz.
5 dwt. = ½ of 10 dwt.		3 .	$10\frac{1}{2}$	= .... 10 dwt.
2 dwt. = ⅕ of 10 dwt.		1 .	$11\frac{1}{4}$	= .... 5 dwt.
1 dwt. = ½ of 2 dwt.			$9\frac{3}{10}$	= .... 2 dwt.
12 gr. = ½ of 1 dwt.			$4\frac{13}{20}$	= .... 1 dwt.
6 gr. = ½ of 12 gr.			$2\frac{13}{40}$	= .... 12 gr.
2 gr. = ⅓ of 6 gr.			$1\frac{13}{80}$	= .... 6 gr.
			$\frac{31}{80}$	= .... 2 gr.
	£2 .	13 .	$9\frac{23}{40}$	= cost of 6 oz. 18 dwt. 20 gr.

(145)
$$\begin{array}{r|l}
 & 1|67\cdot|96|16\ (\ 12\cdot96 \\
 & 1 \\
\hline
22 & 67 \\
 & 44 \\
\hline
249 & 2396 \\
 & 2241 \\
\hline
2586 & 15516 \\
 & 15516 \\
\hline
\end{array}$$

$$\sqrt{\frac{529}{2401}} = \frac{\sqrt{529}}{\sqrt{2401}} = \frac{23}{49}$$

(146) $\dfrac{\frac{1}{16} \text{ of } 120 + \frac{4}{9} \text{ of } 63 + \frac{8}{15} \text{ of } 30}{309} = \dfrac{7\cdot5+28+16}{309} = \dfrac{51\cdot5}{309}$

$= \cdot1\dot{6}.$

(147) $\frac{788}{241\times28} = \frac{197}{241\times7} = \frac{197}{1687}$;

10 ac. = (4840 × 10) sq. yd.;

∴ length of one side = 220 yd.;

∴ length of 4 sides = 880 yd.;

and $\frac{1760}{880} = 2$.

(148) Interest = £$\frac{880\times5\times9}{100\times4\times2}$ = £49·5 = £49. 10*s.*;

P. W. = £$\frac{800\times929\cdot5}{845}$ = £880;

∴ discount = £929. 10*s.* − £880 = £49. 10*s.*

(149) Cost = 41 {£1 + 3*s.* + 2*s.* 4*d.* + 1*s.* 4*d.*} = £54. 13*s.* 4*d.*

(150) From midnight on Sunday to 6 P.M. on Wednesday is 66 hours;

in 66 hours the clock loses 22 minutes;

∴ taking away the 10 minutes already gained, the clock stands at 12 minutes before 6, that is, at 5 h. 48 min.

(151) Cash received = £$\frac{1700\times96}{100}$ = £(17 × 96) = £1632;

annual income = £$\frac{1632\times5}{100}$ = £81·6 = £81. 12*s.*

(152) $\frac{747}{960} = \frac{249}{320} = \frac{24\cdot9}{32} = \frac{6\cdot225}{8} = \cdot778125$;

$\frac{2\times7\times11\times5}{5\times12\times21\times2} = \frac{11}{36} = \frac{2\cdot75}{9} = \cdot30\dot{5}.$

(153) $\frac{13\times125\times7\times8}{24\times156\times75}=\frac{5\times7}{3\times12\times3}=\frac{35}{108}$;
$\frac{14\times25\times75\times16}{15\times42\times108\times16}=\frac{5\times25}{3\times108}=\frac{125}{324}$;
∴ the sum $=\frac{105+125}{324}=\frac{230}{324}=\frac{115}{162}$.

(154) $(\cdot375\times21)s.=7\cdot875s.=7s.\ 10\frac{1}{2}d.$;
$\frac{54}{99}$ of $99d.=54d.=4s.\ 6d.$;
$\frac{27}{990}$ of $55s.=\frac{3}{2}s.=1s.\ 6d.$;
$$\therefore \left.\begin{array}{l}\text{sum is } 13s.\ 10\frac{1}{2}d. = 333 \text{ halfpence}\\ \text{and } \pounds1.\ 11s.\ 6d. = 756 \text{ halfpence}\end{array}\right\}\therefore \text{ fraction} = \frac{333}{756}=\frac{37}{84}.$$

(155) $\pounds\frac{2\frac{1}{4}\times368\cdot75}{100}=\pounds\frac{33\cdot1875}{4}=\pounds8\cdot296875$;
$\frac{5}{240}$ of $\pounds368\cdot75=\pounds\frac{368\cdot75}{48}=\pounds7\cdot682291\dot{6}$;
∴ difference $=\pounds\cdot614583\dot{3}=12s.\ 3\frac{1}{2}d.$

(156) $\pounds40=(11\cdot57\times40)$ guilders;
$=\frac{11\cdot57\times40\times101}{175}$ thalers;
$=\frac{11\cdot57\times40\times101\times7\cdot35}{175\times2}$ francs;
$=981\cdot5988$ francs.

(157) Premium $=\frac{27}{240\times100}$ of $\pounds4325\cdot875=\pounds\frac{9\times4325\cdot875}{80}$
$=\pounds\frac{38\cdot932875}{8}=\pounds4\cdot866609375=\pounds4.\ 17s.\ 3\cdot98625d.$

(158) Interest $=\pounds\frac{845\cdot5\times6\times9}{200}=\pounds228\cdot285=\pounds228.\ 5s.\ 8\cdot4d.$

(159) Interest $=\pounds\frac{2000\times3\times7}{400}=\pounds105$;
discount $=\frac{21}{421}$ of $\pounds2000=\pounds99.\ 15s.\ 2\frac{418}{421}d.$;
∴ difference $=\pounds5.\ 4s.\ 9\frac{3}{421}d.$

(160) (1) $\frac{5\times4\times9\times16}{8\times3\times4\times5}=6$;
(2) $\frac{17\times24}{12+8+21+10}-\frac{36\times5}{18\times5}=\frac{17\times24}{51}-\frac{36}{18}=8-2=6.$

(161) $9\frac{1}{9}\times9=\frac{82}{9}\times9=82$;
$9\frac{1}{9}\times90=\frac{82}{9}\times90=820$;
$117\times9=1053.$

(162) Real distance = 22 yd. $-\frac{22\times5}{12}$ in. = 22 yd. $-9\frac{1}{6}$ in.
= 21 yd. 2 ft. $2\frac{5}{6}$ in.

(163) 13 po. 2 yd. 1 ft. 4 in. = 2662 in.;
1 fur. 36 po. 2 yd. 5 in. = 15125 in.;
∴ fraction $= \frac{2662}{15125} = \frac{22}{125} = \cdot176$.
Again, $\frac{2\frac{1}{2}}{240} = \frac{5}{240\times2} = \frac{1}{48\times2} = \frac{1}{96}$.

(164)

```
        13|76|41 ( 371             ·40|00|00|00 ( ·6324
         9                          36
   67  | 476                 123  | 400
       | 469                      | 369
  741  |  741                1262 |  3100
       |  741                     |  2524
                            12644 |   57600
                                  |   50576
                                      7024
```

(165) Simple interest $= £\frac{21\cdot5\times3\times4}{100} = £2\cdot58$;
amount at compound interest $= £\frac{21\cdot5\times104\times104\times104}{100\times100\times100}$
$= £24\cdot184576$;
∴ compound interest $= £24\cdot184576 - £21\cdot5 = £2\cdot684576$;
∴ they are as $2\cdot58 : 2\cdot684576 = 2580000 : 2684576$
$= 1875 : 1951$.

(166) P. W. $= \frac{100}{101}$ of $£21\cdot5 = £\frac{2150}{101} = £21.\ 5s.\ 8\frac{92}{101}d.$

(167) Cost price $= \frac{100}{80}$ of $£17\cdot2 = £\frac{172}{8} = £21.\ 10s.$

(168) One gets 3 parts when the other gets 2 parts;
∴ $\frac{3}{5}$ of £5. 9*s*. $10\frac{3}{4}d.$, or, £3. 5*s*. $11\frac{1}{4}d.$ is one man's share;
and $\frac{2}{5}$ of £5. 9*s*. $10\frac{3}{4}d.$, or, £2. 3*s*. $11\frac{1}{2}d.$ is the other man's share.

(169) $16s. + \frac{110}{12}s. + \frac{17}{4}s. + \frac{1375\times20}{1000}s. + \frac{21\times10}{90}s.$
$= (16 + \frac{110}{12} + \frac{17}{4} + \frac{55}{2} + \frac{7}{3})s. = \frac{720}{12}s. = 60s. = £3.$

(170) $3 \cdot 75$ of $100d. = 375d. = \pounds 1.\ 11s.\ 3d.$;
$\frac{54}{90}$ of $55s. = \frac{3}{5}$ of $55s. = \pounds 1.\ 13s.$;
$\frac{27}{999}$ of $222d. = \frac{3}{111}$ of $222d. = 6d.$;
$\therefore$ sum is $\pounds 3.\ 4s.\ 9d.$;
and fraction $= \frac{777}{1739} = \frac{21}{47}$.

(171) $\frac{2}{100}$ of $\pounds 455\frac{5}{6} = \pounds\frac{2735}{300} = \pounds 9 \cdot 11\dot{6}$;
$\frac{4 \cdot 5}{240}$ of $\pounds 455\frac{5}{6} = \pounds\frac{4 \cdot 5 \times 2735}{2400 \times 6} = \pounds\frac{547}{64} = \pounds 8 \cdot 546875$;
$\therefore$ difference $= \pounds \cdot 569791\dot{6} = 11s.\ 4\frac{3}{4}d.$

(172) $\pounds 10 = 252$ francs
$= \frac{252 \times 19}{2 \times 35}$ thalers
$= \frac{252 \times 19 \times 107}{2 \times 35 \times 60}$ florins
$= 121 \cdot 98$ florins.

(173) $2\frac{1}{4} \times 5\frac{1}{3} = \frac{9 \times 16}{4 \times 3} = 12$;
$\therefore$ P. W. $= \frac{100}{112}$ of $\pounds 810\frac{5}{6} = \pounds\frac{100 \times 4865}{112 \times 6} = \pounds\frac{17375}{24}$
$= \pounds 723.\ 19s.\ 2d.$

(174) Money obtained by sale $= \pounds\frac{3430 \times 85\frac{1}{2}}{100} = \pounds\frac{343 \times 171}{20}$;
stock obtained by purchase $= \pounds\frac{343 \times 171 \times 100}{20 \times 98} = \pounds 2992\frac{1}{2}$;
$\therefore$ 1st income $= \pounds\frac{3430 \times 7}{200} = \pounds 120.\ 1s.$;
2nd income $= \pounds\frac{2992 \cdot 5 \times 4}{100} = \pounds 119.\ 14s.$;
$\therefore$ difference $= 7s.$

(175) Cubic content of water $= \frac{93 \cdot 75 \times 112 \times 16}{1000}$ cub. ft.;
$\therefore$ depth $= \frac{93 \cdot 75 \times 112 \times 16}{1000 \times 8 \times 7}$ ft. $= \frac{93 \cdot 75 \times 32}{1000}$ ft. $= 3$ ft.

(176) $24 + \frac{1}{7} + \frac{1}{3} + \frac{3}{14} + \frac{1}{6} = 24 + \frac{36}{42} = 24\frac{6}{7}$;
$(\frac{82}{15} \times \frac{42}{41}) \div (\frac{3}{5} - \frac{1}{4}) = \frac{28}{5} \div \frac{7}{20} = 16.$

(177) $(\frac{2}{17} \times \frac{51}{8} \times 130) \div 195 = \frac{3 \times 65}{2 \times 195} = \frac{1}{2}.$

(178) He buys 112 lb. for $\pounds 24$;
$\therefore$ he buys 6144 lb. for $\pounds\frac{6144 \times 24}{112}$, or, $\pounds\frac{9216}{7}$;
$\therefore$ he gains $\pounds 1500 - \pounds\frac{9216}{7}$, or, $\pounds\frac{1284}{7}$ on an outlay of $\pounds\frac{9216}{7}$;
$\therefore$ he gains per cent $\frac{100 \times 1284}{9216}$, or, $13\frac{179}{192}$.

(179) $6\frac{2}{3} \times \frac{1}{12} \times 3\frac{3}{5} = \frac{20 \times 18}{3 \times 12 \times 5} = 2$;

∴ discount $= \frac{2}{102}$ of £68. 3*s.* 6*d.* = £1. 6*s.* $8\frac{14}{17}$*d.*

(180) For £1 income in the $3\frac{1}{2}$ per cents. I pay £$\frac{91 \times 2}{7}$, or, £26;

for £4 income in the $3\frac{1}{2}$ per cents. I pay 4 × £26, or, £104;

∴ the 4 per cents. is the better investment.

Again, investing £26 produces 235*d.* income;

∴ for an income of £470 I must invest £$\frac{26 \times 470 \times 240}{235}$, or, £12480.

(181)

```
   1|79|82|81 ( 1341          2|·50|00|00 ( 1·581....
   1                          1
23 | 79                    25 | 150
   | 69                       | 125
264| 1082                 308 | 2500
   | 1056                     | 2464
2681| 2681                3161| 3600
    | 2681                    | 3161
```

(182) (Feet in breadth)^2 + $(55)^2 = (78)^2$;

∴ (feet in breadth)$^2 = 6084 - 3025 = 3059$;

∴ feet in breadth $= \sqrt{3059} = 55 \cdot 3 \ldots.$

(183) $\dfrac{3\frac{1}{2} \times 5}{7\frac{1}{2} \times 21} = \frac{7 \times 5}{15 \times 21} = \frac{1}{9} = \cdot\dot{1}$.

(184) 25 + 30 + 42 = 97;

∴ first town has to pay $\frac{25}{97}$ of £530, or, £$136\frac{58}{97}$;

second town has to pay $\frac{30}{97}$ of £530, or, £$163\frac{89}{97}$;

third town has to pay $\frac{42}{97}$ of £530, or, £$229\frac{47}{97}$.

(185) In 1 year £1600 gives £$\frac{166}{4 \cdot 5}$;

∴ £100 gives £$\frac{166}{16 \times 4 \cdot 5}$, or, £$\frac{83}{36}$, or, £$2\frac{11}{36}$.

(186) $\dfrac{\frac{7 \times 3 \times 3}{2 \times 14}}{\frac{3 \times 7 \times 2}{6 \times 7}} \div \frac{9}{14} = \frac{9}{4} \times \frac{14}{9} = 3\frac{1}{2}$.

(187) Area of two long sides = $(2 \times 3\frac{9}{24} \times 4\frac{9}{48})$ sq. ft.
$= \frac{16281}{576}$ sq. ft.;
area of two short sides = $(2 \times 3\frac{9}{24} \times 2\frac{7}{48})$ sq. ft.
$= \frac{8343}{576}$ sq. ft.;
area of top and bottom = $(2 \times 4\frac{9}{48} \times 2\frac{7}{48})$ sq. ft.
$= \frac{20703}{1152}$ sq. ft.;
∴ whole area = $\frac{69951}{1152}$ sq. ft. = $\frac{23317}{384}$ sq. ft.;
∴ cost = $\frac{23317 \times 23}{384 \times 4}$*d.* = £1. 9*s.* $1\frac{227}{1536}$*d.*

(188) $(2{\cdot}75 \times 2{\cdot}5 \times 9)$ sq. ft. = $61{\cdot}875$ sq. ft.;
$61{\cdot}875$ sq. ft. − $9{\cdot}45$ sq. ft. = $52{\cdot}425$ sq. ft.

(189) $\frac{101015-1010}{99000} \div \frac{55}{100} = \frac{100005}{990 \times 55} = \frac{6667}{3630}$.

(190) The up train takes $5\frac{1}{4}$ hours to perform the whole journey;
when the down train starts, the up train has been $3\frac{3}{4}$ hours on the road, and therefore it has finished $3\frac{3}{4} \div 5\frac{1}{4}$, or, $\frac{15}{21}$ of the journey;
thus at 10 A.M. we have the up train and down train starting at opposite ends of $\frac{6}{21}$, or, $\frac{2}{7}$ of the whole distance;
their rates are as 21 to 13;
∴ down train goes $\frac{21}{34}$ of $\frac{2}{7}$ of the whole distance, or, $\frac{3}{17}$ of the distance when they meet;
and the down train goes over $\frac{3}{17}$ of the distance in $\frac{3}{17}$ of $3\frac{1}{4}$ hours, or, $\frac{39}{68}$ hr., or, $34\frac{7}{17}$ min.;
∴ they meet at 10 hr. $34\frac{7}{17}$ min.

(191) $$\frac{5-\frac{14\times5}{5\times3}}{\frac{7\times8}{9\times5}-\frac{41}{45}} - \frac{\frac{11}{5}}{\frac{4}{5}+\frac{7}{5}} = \frac{5-\frac{14}{3}}{\frac{56-41}{45}} - \frac{11}{11} - \frac{15}{15} - 1 = 0.$$

(192) $$\begin{array}{r|l} 12 & 8{\cdot}25 \\ \hline 100 & 17{\cdot}6875 \\ \hline & {\cdot}176875 \end{array}$$

$${\cdot}176875 = \frac{176875}{1000000} = \frac{283}{1600}.$$

(193) Value of the whole vessel is $\frac{7}{4}$ of 1342*s.*;
∴ value of $\frac{2}{11}$ of the vessel is $\frac{2\times7\times1342}{4\times11}$*s.*, or, £21. 7*s.*

(194) $(3\cdot145 \times 69\cdot5)$ mi. $= 218\cdot5775$ mi. = 218 mi. 4 fur. $24\cdot8$ po;
$\frac{3145-31}{990}$ of 275*d.* $= \frac{3114\times5}{18}$*d.* = £3. 12*s.* 1*d.*

(195) The faster vessel performs the voyage in 120 hours;
the slower vessel performs the voyage in (120+36) hr., or, 156 hr.;
∴ her average rate is $\frac{1200}{156}$ mi., or, $7\frac{9}{13}$ mi.

(196)

$$\begin{array}{r|l} & 1|67|96|16\ (1296 \\ & 1 \\ \hline 22 & 67 \\ & 44 \\ \hline 249 & 2396 \\ & 2241 \\ \hline 2586 & 15516 \\ & 15516 \\ \hline \end{array} \qquad \begin{array}{r|l} & 12|96\ (36 \\ & 9 \\ \hline 66 & 396 \\ & 396 \\ \hline \end{array}$$

∴ 36 is the fourth root.

(197) Area of floor $= (27\frac{1}{3} \times 20\frac{1}{6})$ sq. ft. $= \frac{82\times121}{3\times6}$ sq. ft.;
matting required $= \frac{82\times121\times9}{22\times3\times6}$ ft. $= \frac{41\times11}{2\times3}$ yd. $= 75\frac{1}{6}$ yd.

(198) $\dfrac{\frac{5\times9}{4\times5}-\frac{5\times6}{3\times5}}{\frac{7}{4}+\frac{17\times3}{34\times4}} + \frac{2}{17} = \dfrac{\frac{9}{4}-\frac{6}{3}}{\frac{7}{4}+\frac{3}{8}} \times \frac{17}{2} = \frac{2}{17} \times \frac{17}{2} = 1.$

(199) $\frac{2}{5} \times \frac{5}{4}$, or, $\frac{1}{2}$ of the estate is worth £300;
∴ $\frac{5\times14}{5\times2}$, or, 7 times the estate is worth £4200.

(200) Selling price $= \frac{110}{100}$ of 15*s.* $= 16\cdot5$*s.* = 16*s.* 6*d.*

(201) Cubic content $= (27 \times 1\frac{3}{4} \times 1\frac{1}{6})$ cub. ft. $= \frac{49}{24}$ cub. yd.;
∴ cost of timber $= \frac{49\times4}{24}$*s.* $= \frac{49}{6}$*s.* = 8*s.* 2*d.*

(202) $\frac{11}{13} + \frac{1}{15} = \frac{165+13}{13\times15} = \frac{178}{195}$;
∴ $\frac{17}{195}$ of the cable is $234\frac{2}{3}$ yd.;
∴ length of cable $= \frac{195\times704}{17\times3} = 2691\frac{13}{17}$ yd.

(203) ac. ro. po. sq. yd.
4 . 3 . 14 . $26\frac{1}{2}$
4

19 ro.
40

774 po.
$30\frac{1}{4}$

$193\frac{1}{2}$
23220
$26\frac{1}{2}$

23440 sq. yd.
9

210960 sq. ft.
144

843840
843840
210960

30378240 sq. in.

yd. ft. in.
260 . 1 . 4
3

781 ft.
12

9376 in.

in. sq. in. in.
9376) 30378240 (3240
28128

22502
18752

37504
37504

0

and 3240 in. = 270 ft.

(204) $\frac{1080}{37250360} = \frac{108}{3725036} = \cdot0000289\ldots$

(205) 1 qr. 13 lb. $7\frac{1}{5}$ oz. = 41 lb. $7\frac{1}{5}$ oz. = $663\frac{1}{5}$ oz.;
∴ fraction = $\frac{3316}{5\times20\times4\times28\times16} = \frac{829}{44800}$.

(206) $1\cdot23 \times \cdot0059 = \cdot007257$;
$\frac{\cdot007257}{\cdot005} = \frac{7\cdot257}{5} = 1\cdot4514$.

(207)

	2		16|777|216 8
6	5	1200 325 1525 25	8777 7625
75	6	187500 4536 192036	1152216 1152216

(208) Insurance = $\frac{1}{12}$ of £3561. 11*s.* $7\frac{1}{2}$*d.* = £296. 15*s.* $11\frac{5}{8}$*d.*

(209) 65 nap. = £$\frac{65\times20\cdot8}{25\cdot45}$ = £$\frac{65\times2080}{2545}$ = £$53\frac{63}{509}$.

(210) 800 + 756 + 404 = 1960;
∴ Portsmouth sends $\frac{800}{1960}$ of 490, or, 200;
Plymouth sends $\frac{756}{1960}$ of 490, or, 189;
Sheerness sends $\frac{404}{1960}$ of 490, or, 101.

(211) Principal = $\frac{100}{5}$ of £341. 5*s.* = £6825.

(212) 24 + ·24 + ·024 + 1·0024 = 25·2664;
$\frac{252664}{10000} = \frac{63166}{2500} = \frac{31583}{1250}$.

(213) (*a*) $\frac{72\cdot36}{3\cdot6} = \frac{723\cdot6}{36} = 20\cdot1$;
$\frac{72\cdot36}{\cdot0036} = \frac{723600}{36} = 20100$.

(*β*) $\frac{4\cdot4+\cdot6}{7\cdot375-\cdot125+\cdot75} = \frac{5}{8} = \cdot625$.

(*γ*) $\frac{2\times21}{9}$*s.* + $\frac{3\times20}{8}$*s.* + $\frac{1\times5}{2}$*s.* + $\frac{5}{24}$*s.* = $\frac{357}{24}$*s.*;
∴ first fraction = $\frac{357}{24\times20} = \frac{17\cdot85}{24} = \cdot74375$;
second fraction = $\frac{\cdot74375}{100} = \cdot0074375$.

(214) We have to find the hypotenuse of a right-angled triangle, of which the other sides are 72 miles and 54 miles;
∴ distance = $\sqrt{}$ (5184 + 2716) miles = $\sqrt{}$ (8100) miles = 90 miles.

(215) (*a*) Interest on £$416\frac{2}{3}$ for 1 year = £$\frac{1250\times4}{3\times100}$ = £$16\frac{2}{3}$;
interest on £$433\frac{1}{3}$ for 1 year = £$\frac{1300\times4}{3\times100}$ = £$17\frac{1}{3}$;
∴ simple interest = £$33\frac{1}{3}$; compound interest = £34;
∴ difference is 13*s.* 4*d.*

(*β*) £12. 16*s.* is the interest on £213. 6*s.* 8*d.* for $1\frac{1}{2}$ years;
∴ interest on £$213\frac{1}{3}$ for 1 year is £$\frac{2\times12\cdot8}{3}$;
∴ interest on £100 for 1 year is £$\frac{100\times2\times12\cdot8\times3}{640\times3}$ = £4.

(216) Area of walls = $\{(48+40) \times 14\frac{1}{4}\}$ sq. ft. = 1254 sq. ft.
deductions = $\{(8 \times 5\frac{1}{4} \times 4) + (10 \times 6\frac{2}{3} \times 2) + (6\frac{1}{2} \times 5)\}$ sq. ft. = $333\frac{5}{6}$ sq. ft.;
∴ area of paper = $(1254 - 333\frac{5}{6})$ sq. ft. = $920\frac{1}{6}$ sq. ft.;
∴ length of paper = $\frac{5521 \times 2}{5 \times 6}$ ft. = $\frac{5521}{45}$ yd.;
∴ cost of paper = $\frac{5521 \times 45}{45}q.$ = 5521*q.* = £5. 15*s.* $0\frac{1}{4}$*d.*

(217)

$$\begin{array}{rrrr} & £ & s. & d. \\ & 217 & 11 & 4 \\ & & & 21\frac{3}{4} \\ \hline 4 & 652 & 14 & 0 \\ \hline & 163 & 3 & 6 \\ & 4568 & 18 & 0 \\ \hline & 4732 & 1 & 6 \end{array}$$

14 lb. = $\frac{1}{2}$ of 1 qr.
7 lb. = $\frac{1}{2}$ of 14 lb.
2 lb. = $\frac{1}{7}$ of 14 lb.
1 lb. = $\frac{1}{2}$ of 2 lb.

$$\begin{array}{rrr} £ & s. & d. \\ 1 & 2 & 4 \\ & & 271 \\ \hline 302 & 12 & 4 \\ & 11 & 2 \\ & 5 & 7 \\ & 1 & 7\frac{1}{7} \\ & & 9\frac{4}{7} \\ \hline 303 & 11 & 5\frac{5}{7} \end{array}$$

(218) 3 ro. 7 po. 28 yd. 2 ft. 36 in. = 5015520 sq. in.;
1 ac. 31 po. 27 yd. 2 ft. 36 in. = 7523280 sq. in.;
∴ fraction = $\frac{5015552}{7523328} = \frac{2}{3} = \cdot\dot{6}$.

(219) $\cdot 0\dot{1}\dot{4} = \frac{14}{990} = \frac{7}{495}$; and $\cdot 1\dot{0}5\dot{0} = \frac{1049}{9990}$.

$$\begin{array}{r|l} & 184\cdot117761\ (13\cdot569 \\ & 1 \\ \hline 23 & 84 \\ & 69 \\ \hline 265 & 1511 \\ & 1325 \\ \hline 2706 & 18677 \\ & 16236 \\ \hline 27129 & 244161 \\ & 244161 \\ \hline \end{array}$$

(220) Interest = £$\frac{127750\times60\times7}{100\times365\times2}$ = £$\frac{350\times60\times7}{100\times2}$ = £735;
P. W. = $\frac{1600}{1717}$ of £1302. 1*s.* 2*d.* = £1213. 6*s.* 8*d.*;
∴ discount = £1302. 1*s.* 2*d.* − £1213. 6*s.* 8*d.* = £88. 14*s.* 6*d.*

(221) Area of paper = $\{(42+33)\times10\frac{1}{4}\}$ sq. ft. = $\frac{3075}{4}$ sq. ft.;
cost of paper = $\frac{3075\times13}{4\times9\times2}$*d.* = $555\frac{5}{24}$*d.* = £2. 6*s.* $3\frac{5}{24}$*d.*

(222) £100 amounts in the time to £135;
∴ sum required = $\frac{100}{135}$ of £425. 19*s.* $4\frac{4}{5}$*d.* = £315. 10*s.* 8*d.*

(223) Income = $(5\frac{7}{32}\times529\times60)$*s.* = $\frac{1325145}{8}$*s.*
= £8282. 3*s.* $1\frac{1}{2}$*d.*

(224) The old tax was £$\frac{1}{60}$ in the pound;
the new tax is therefore £$\frac{1}{40}$ in the pound;
∴ sum paid is $\frac{1}{40}$ of £345. 10*s.*, or, £8. 12*s.* 9*d.*

(225) 188 tons 13 cwt. 2 qr. 19 lb. 14 oz.

(226)

$$\begin{array}{rcrcr} £ & & s. & & d. \\ 8 & . & 1 & . & 1\frac{1}{2} \\ & & & & 9 \\ \hline 72 & . & 10 & . & 1\frac{1}{2} \\ & & & & 9 \\ \hline 652 & . & 11 & . & 1\frac{1}{2} \\ & & & & 7 \\ \hline £4567 & . & 17 & . & 10\frac{1}{2} \end{array}$$

(227) 1 cwt. costs $\frac{3969\times64}{9}$*d.*, or, (441×64)*d.*
∴ 1 oz. costs $\frac{441\times64}{112\times16}$*d.*, or, 1*s.* $3\frac{3}{4}$*d.*

(228) Length of carpet = $\frac{26\times35}{2\frac{1}{3}\times3}$ yd.
= 130 yd.

(229) $(\frac{271}{697}+\frac{5}{17})\div\frac{7\times8}{41\times2}=\frac{476}{41\times17}\times\frac{41}{28}=\frac{476}{476}=1.$

(230) $\frac{22\cdot5}{1\cdot5\times27\times1728}=\frac{5}{9\times1728}=\frac{5}{15552}=\cdot000321\ldots$

(231) Taxes = $\frac{12\frac{2}{5}}{100}$ of £850 = £$\frac{62\times850}{500}$ = £105. 8*s.*;
∴ amount = £850 + £105. 8*s.* = £955. 8*s.*

(232) In 1 day they jointly mow $(\frac{5}{3}+\frac{7}{9}+\frac{11}{12})$ ac., or, $\frac{121}{36}$ ac.;
∴ they will take $(121\div\frac{121}{36})$ days, or, 36 days.

(233) 360138569; three hundred and sixty millions, one hundred and thirty-eight thousand, five hundred and sixty-nine.

(234) $(\frac{8}{10} \text{ of } \frac{3}{5}) \div (\frac{10}{8} \text{ of } \frac{5}{3}) = \frac{12}{25} \div \frac{25}{12} = \frac{144}{625}$.

(235) $\frac{5 \times 21}{14}s. + \frac{5}{8}s. + \frac{5}{24}s. = 7s.\ 6d. + 7\frac{1}{2}d. + 2\frac{1}{2}d. = 8s.\ 4d.$;
$\frac{100}{240} = \frac{5}{12} = \cdot 41\dot{6}$.

(236) $\cdot 0214 \times 2\cdot 14 = \cdot 045796$;
$\frac{17\cdot 82}{\cdot 0011} = \frac{178200}{11} = 16200$;
$(\cdot 05 \times 20 + \cdot 3 \times 21 + \cdot 75 \times 5 + \cdot 8)s. = 11\cdot 85s.$
$= 11s.\ 10\frac{1}{5}d.$

(237)

	£	s.	d.	
5 dwt. $= \frac{1}{4}$ of 1 oz.	3	17	10	=cost of 1 oz.
			69	
	268	10	6	=cost of 69 oz.
$2\frac{1}{2}$ dwt. $= \frac{1}{2}$ of 5 dwt.		19	$5\frac{1}{2}$	= . . . . . . 5 dwt.
		9	$8\frac{3}{4}$	= . . . . . . 2 dwt. 12 gr.
	£269	19	$8\frac{1}{4}$	=cost of 5 lb. 9 oz. 7 dwt. 12 gr.

(238) Express takes $(192 \div 40)$ hr., or, $4\frac{4}{5}$ hr.;
mail takes $(192 \div 28)$ hr., or, $6\frac{6}{7}$ hr.;
∴ time saved $= (6\frac{6}{7} - 4\frac{4}{5})$ hr. $= 2\frac{2}{35}$ hr.

(239) Interest $= £\frac{750 \times 3\frac{1}{4} \times \frac{4}{3}}{100} = £\frac{75 \times 13}{3 \times 10} = £32.\ 10s.$

(240) The first and second pay $\frac{1}{3} + \frac{6}{5}$ of $\frac{1}{3}$, or, $\frac{11}{15}$;
∴ $\frac{4}{15}$ of the bill = £2. 10*s*., and ∴ the bill is £9. 7*s*. 6*d*.

(241) $(\frac{4}{5} + \frac{13 \times 5}{11} \times \frac{11}{5} - \frac{6}{7}) \div \frac{453}{245}$;
$(\frac{4}{5} + 13 - \frac{6}{7}) \div \frac{453}{245} = \frac{453}{35} \times \frac{245}{453} = 7$.

(242) $2\cdot 45 \times \cdot 05 = \cdot 1225$;
$\frac{\cdot 0225}{2\cdot 5} = \frac{\cdot 225}{25} = \cdot 009$;
$\frac{25}{1000}$ of 2 qr. 6 lb. 4 oz. $= \frac{1}{40}$ of 62 lb. 4 oz. = 1 lb. 8·9 oz.

(243) The cargo is worth $\frac{7}{5}$ of £16000, or, £22400;
$\therefore$ $\frac{2}{3}$ of $\frac{7}{8}$ of $\frac{2}{7}$ of the cargo is worth £$\frac{22400}{6}$, or, £3733$\frac{1}{3}$.

(244) Thickness = $\frac{40 \times 27}{54 \times 5}$ ft. = 4 ft.

(245) $\frac{3 \times 25}{900}$*s.* + $\frac{63 \times 100}{900}$*s.* − $\frac{8 \times 9}{9 \times 4}$*s.* = 1*d.* + 7*s.* − 2*s.* = 5*s.* 1*d.*

(246) Cost = $\frac{21 \times 15\frac{5}{8} \times 14\frac{2}{5}}{9}$*d.* = $\frac{7 \times 125 \times 72}{3 \times 5 \times 8}$*d.* = £2. 3*s.* 9*d.*

(247) Selling price = $\frac{110}{100}$ of £12. 15*s.* = £14. 0*s.* 6*d.*

(248) It loses 2 min. 49 sec. in 6$\frac{1}{2}$ days;
$\therefore$ in 1 day it loses $\frac{169 \times 2}{13}$ sec., or, 26 sec.

(249) $\frac{\frac{26}{51}}{\frac{13}{3}} \div \frac{\frac{3}{4}}{\frac{17}{4}} = \frac{26 \times 3 \times 17}{51 \times 13 \times 3} = \frac{2}{3}$.

(250) $\frac{4}{7}$ of $\frac{17\frac{1}{2}}{40} = \frac{4 \times 35}{7 \times 80} = \frac{1}{4}$.

(251) $\frac{250}{900}$ of 90*s.* = 25*s.* = £1. 5*s.*

(252) Value = $\frac{3{\cdot}5 \times 4{\cdot}5 \times 1{\cdot}5}{3}$*s.* = 7·875*s.* = 7*s.* 10$\frac{1}{2}$*d.*

(253)

$$\begin{array}{r|l} & 1{\cdot}014049\,(\,1{\cdot}007 \\ & 1 \\ \hline 2007 & \quad 14049 \\ & \quad 14049 \\ \hline \end{array}$$

$\sqrt{175\frac{9}{16}} = \sqrt{\frac{2809}{16}} = \frac{53}{4} = 13\frac{1}{4}$

(254) *A*'s income = £$\frac{552 \times 3\frac{1}{4}}{92}$ = £(6 × 3$\frac{1}{4}$) = £19. 10*s.*
B's income = £$\frac{679 \times 3}{97}$ = £(7 × 3) = £21.
$\therefore$ difference is £1. 10*s.*

(255) 1 man earns £1 in $\frac{5 \times 6}{8}$ days;
$\therefore$ 15 men earn £4 in $\frac{5 \times 6 \times 4}{8 \times 15}$ days, or, 1 day.

(256) One pipe fills $\frac{2}{3}$ in an hour;
$\therefore$ the other fills $\frac{1}{3}$ in an hour;
$\therefore$ it takes 3 hours to fill the vessel.

(257) The estate is worth $\frac{49}{4}$ of £46. 7*s*. 8*d*.;
$\therefore$ $\frac{2}{11}$ of it is worth $\frac{2 \times 49}{4 \times 11}$ of £46. 7*s*. 8*d*., or, £103. 6*s*. 2*d*.

(258) Length of step $= \frac{3\frac{1}{2} \times 1760 \times 36}{110 \times 60}$ in. $= \frac{7 \times 16 \times 18}{60}$ in.
$= 33 \cdot 6$ in.

(259) £100 gives £$(5\frac{1}{2} \times 3\frac{1}{4})$, or, £$\frac{143}{8}$ interest;
$\therefore$ sum required = £$\frac{208 \times 8 \times 100}{143}$, or, £$\frac{16 \times 800}{11}$, or,
£1163. 12*s*. $8\frac{8}{11}$*d*.

(260) Area to be paved $= \{ 850 \times (5\frac{1}{4} \times 2) \}$ sq. ft.
$= (425 \times 21)$ sq. ft.;
cost $= (425 \times 21 \times 15\frac{1}{4})$*d*. = £567. 2*s*. $2\frac{1}{4}$*d*.

(261) $\frac{5 \times 112}{12}$ lb. $+ \frac{2 \times 28}{7}$ lb. $+ \frac{7}{8}$ lb. $= \frac{1333}{24}$ lb.
$\therefore$ fraction $= \frac{1333}{24 \times 112 \times 20} = \frac{16 \cdot 6625}{672} = \cdot 02479538 \ldots$

(262) Thickness $= \frac{1728}{4026 \times 10000} = \frac{288}{671 \times 10000} = \frac{18}{419375}$.

(263) $\dfrac{\frac{11}{5} \div \frac{22}{7}}{\frac{1}{6} \times \frac{4}{7}} = \frac{11 \times 7 \times 6 \times 7}{5 \times 22 \times 4} = \frac{147}{20} = 7\frac{7}{20}$.

(264) $\frac{3}{14} \div 240 = \frac{1}{14 \times 80} = \frac{1}{1120}$.

(265) $\frac{15}{36} = \cdot 41\dot{6}$; and $(\cdot 0208 \times 240)$*d*. $= 4 \cdot 992$*d*.

(266) $4 + 5 + 6 = 15$;
$\therefore$ *A*'s share $= \frac{4}{15}$ of £1000 = £266. 13*s*. 4*d*.;
$\therefore$ *B*'s share $= \frac{5}{15}$ of £1000 = £333. 6*s*. 8*d*.;
$\therefore$ *C*'s share $= \frac{6}{15}$ of £1000 = £400.

(267) Hypotenuse $= \sqrt{(30^2 + 40^2)}$ ft. $= \sqrt{2500}$ ft. $= 50$ ft.

(268) Length of street + length of column = 8700 ft.;
$\therefore$ time $= \frac{8700}{58 \times 2\frac{1}{2}}$ min. = 60 min. = 1 hr.

(269) Length cut off = $\frac{2\frac{1}{2}}{1\frac{1}{3} \times 1\frac{1}{4}}$ ft. = $\frac{5\times3\times4}{2\times4\times5}$ ft. = $1\frac{1}{2}$ ft.;

∴ length remaining is $16\frac{1}{2}$ ft.

(270) $\left(\frac{\frac{11}{4}+\frac{17}{5}}{\frac{21}{5}+\frac{21}{4}}+\frac{\frac{11}{3}}{\frac{21}{2}}\right) \times \left(\frac{\frac{26}{11}}{\frac{13}{5}}+\frac{\frac{29}{11}}{\frac{87}{10}}\right) - \frac{281}{1405}$;

$= \left(\frac{55+68}{84+105}+\frac{22}{63}\right) \times \left(\frac{5\times2}{11} \times \frac{11\times87}{29\times10}\right) - \frac{1}{5}$;

$= \frac{123+66}{189} \times 3 - \frac{1}{5} = 1 \times 3 - \frac{1}{5} = 3 - \frac{1}{5} = 2\frac{4}{5}$.

(271)

	£	s.	d.	
	3	13	4	= cost of 1 ac.
			12	
	44	0	0	= ..... 12 ac.
			11	
	484	0	0	= ..... 132 ac.
	7	6	8	= ..... 2 ac.
2 ro. = ½ of 1 ac.	491	6	8	= ..... 134 ac.
1 ro. = ½ of 2 ro.	1	16	8	= ..... 2 ro.
16 po. = $\frac{1}{10}$ of 1 ac.		18	4	= ..... 1 ro.
		7	4	= ..... 16 po.
	£494	9	0	= cost of 134 ac. 3 ro. 16 po.

(272) $\frac{7}{8}$ of 50*s*. = $\frac{350}{8}$*s*. = 43*s*. 9*d*.

$\frac{1}{7}$ of £19. 6*s*. $5\frac{1}{2}$*d*. = £2. 15*s*. $2\frac{1}{2}$*d*.

$\frac{5}{24}$ of 5*s*. = 25 halfpence = 1*s*. $0\frac{1}{2}$*d*.;

∴ sum = £5.

(273) $\frac{33\times24}{9} \div \frac{4\times135}{3} = \frac{88}{4\times45} = \frac{22}{45} = \frac{4\cdot4}{9} = \cdot4\dot{8}$.

(274) Interest for 1 year = $\frac{1}{3}$ of £$13\frac{1}{8}$ = £$4\frac{3}{8}$;

∴ rate = £$\left(\frac{100}{125} \times \frac{35}{8}\right)$ = £$\frac{7}{2}$ = £$3\frac{1}{2}$.

(275) Money from sale = £$\frac{530\times86}{100}$ = £$\frac{53\times43}{5}$;

income from new investment = £$\frac{53\times43\times15}{5\times100\times4}$

= £17·0925;

income from old investment = £$\frac{530\times3}{100}$ = £15·9;

∴ increase = £1·1925 = £1. 3*s*. $10\frac{1}{5}$*d*.

(276) 54 boys in 280 hours do (54×280) times as much as 1 boy in 1 hour, and therefore $\frac{54 \times 280}{42}$ times as much as 42 boys in 1 hour;

hence the 42 boys must work $\frac{54 \times 280}{42}$ hours, or, 360 hours;

$\therefore$ each day they must work $\frac{360}{45}$ hours, or, 8 hours.

(277) Area of carpet $= (20 \times 16\frac{3}{4})$ sq. ft. $= 335$ sq. ft.

also, for 8 guineas we can buy $\frac{8 \times 21 \times 2}{7}$ yd., or, 48 yd.

and 48 yd. of carpet $\frac{3}{4}$ yd. wide will cover 36 sq. yd.;

$\therefore$ area uncovered $= (335 - 324)$ sq. ft. $= 11$ sq. ft.

(278) $\left\{\frac{7 \times 22 \times 46}{11 \times 23 \times 49} + \frac{360 \times 77}{49 \times 120}\right\} \div \left\{\frac{23}{7} + \frac{10 \times 86}{20 \times 129}\right\}$

$= \left(\frac{4}{7} + \frac{33}{7}\right) \div \left(\frac{23}{7} + \frac{1}{3}\right) = \frac{37}{7} \div \frac{76}{21} = 1\frac{35}{76}.$

(279) $\frac{129}{240} = \frac{43}{80} = \frac{4 \cdot 3}{8} = \cdot 5375;$

$\frac{50}{120} = \frac{5}{12}.$

(280) Interest $= £\frac{39 \cdot 625 \times 5 \cdot 5 \times 4}{100} = £8 \cdot 7175 = £8.\ 14s.\ 4\frac{1}{5}d.$

(281) 1 lb. costs $\frac{13 \times 8}{14 \times 7}s.$, or, $\frac{52}{49}s.$;

$\therefore$ $\frac{35}{12}$ cwt. costs $\frac{35 \times 112 \times 52}{12 \times 49}s.$, or, £17. 6*s.* 8*d.*

(282) $\cdot 4\dot{7} = \frac{43}{90}$; $\cdot 68\dot{4}9\dot{4} = \frac{68426}{99900} = \frac{34213}{49950}$;

$\cdot \dot{4}1\dot{3}$ cwt. $= \frac{413 \times 4}{999}$ qr. $= 1$ qr. $18\frac{302}{999}$ lb.

(283) Tin $= \frac{150}{4}$ lb. $= 37\frac{1}{2}$ lb.;

copper $= \frac{450}{4}$ lb. $= 112\frac{1}{2}$ lb.

(284) Area of carpet $= \frac{45 \times 19}{2 \times 9}$ sq. yd.;

length of carpet $= \frac{45 \times 19 \times 2}{2 \times 9}$ yd. $= 95$ yd.

(285) $\dfrac{\frac{3}{2} + \frac{7}{3}}{\frac{7}{3} + \frac{13}{4}} \div \dfrac{\frac{5}{7}}{1 + \frac{3}{7}} - \dfrac{\cdot 6}{6}$

$= \frac{18 + 28}{28 + 39} \div \frac{5}{10} - \frac{1}{10} = \frac{46 \times 10}{67 \times 5} - \frac{1}{10} = 1\frac{183}{670}.$

(286) $(\cdot 3 + \cdot 03 + \cdot 003 + \cdot 0003) \times 30000 = \cdot 3333 \times 30000$

$= 9999.$

$9999 \div \cdot 009 = \frac{9999000}{9} = 1111000.$

(287) Interest $= £\frac{750 \times 2\frac{3}{4} \times 3\frac{1}{4}}{100} = £\frac{15 \times 11 \times 13}{2 \times 4 \times 4} = £\frac{2145}{32}$

$= £67.\ 0s.\ 7\frac{1}{2}d.$

(288) $\frac{1\frac{1}{3} \times 20}{5} = \frac{16}{3} = 5\cdot\dot{3}$;

$\frac{\frac{3}{4} \times 5 + \frac{7}{9} \times 10}{20} = \frac{\frac{15}{4} + \frac{70}{9}}{20} = \frac{415}{36 \times 20} = \frac{83}{144}$;

$(\cdot 02 \times 240 + \cdot 03 \times 90 + \frac{13}{900} \times 33)d.$

$= (4\cdot 8 + 2\cdot 7 + \cdot 47\dot{6})d. = 7\cdot 97\dot{6}d.$

(289)

	£	s.	d.
	1 .	7 .	9
			3
2 qr. = $\frac{1}{2}$ of 1 cwt.	4 .	3 .	3
1 qr. = $\frac{1}{2}$ of 2 qr.		13 .	$10\frac{1}{2}$
14 lb. = $\frac{1}{2}$ of 1 qr.		6 .	$11\frac{1}{4}$
2 lb. = $\frac{1}{7}$ of 14 lb.		3 .	$5\frac{5}{8}$
1 lb. = $\frac{1}{2}$ of 2 lb.			$5\frac{53}{56}$
			$2\frac{109}{112}$
	£5 .	8 .	$3\frac{33}{112}$

(290) Area of walls = (72×11) sq. ft. = 792 sq. ft.;
area of windows = $(2 \times 9 \times 3)$ sq. ft. = 54 sq. ft.;
area of door = $(7 \times \frac{7}{2})$ sq. ft. = $24\frac{1}{2}$ sq. ft.;
area of fireplace = $(4 \times 4\frac{1}{2})$ sq. ft. = 18 sq. ft.;
∴ area to be papered = $695\frac{1}{2}$ sq. ft.;
length of paper = $(695\frac{1}{2} \div 2\frac{1}{4})$ ft. = $\frac{2782}{9}$ ft.;
cost = $\frac{2782 \times 9\frac{1}{2}}{9 \times 36}s. = £4.\ 1s.\ 6\frac{23}{27}d.$

(291) For 51*d.* I can have for 50 hours 5 burners;
1*d.* I can have for 1 hour $\frac{5 \times 50}{51}$ burners;
918*d.* I can have for 60 hours $\frac{5 \times 50 \times 918}{60 \times 51}$, or, 75 burners.

(292) $\frac{\frac{7}{2} + \frac{7}{3}}{\frac{3}{4} \times \frac{55}{6}} = \frac{\frac{35}{6}}{\frac{55}{8}} = \frac{35 \times 8}{6 \times 55} = \frac{28}{33}$.

(293) $\frac{1}{64} = \frac{\cdot125}{8} = \cdot015625$;
$\cdot015625 \times \cdot0064 = \cdot0001$.

(294) $\dfrac{\frac{5}{16} \text{ of } 40}{30} = \frac{5\times4}{16\times3} = \frac{5}{12}$.

(295)
$$\begin{array}{r|r} 12 & 11\cdot25 \\ \hline 3 & 3\cdot9375 \\ \hline 7 & 1\cdot3125 \\ \hline & \cdot1875 \end{array}$$

also, $\frac{3\times1}{4\times8}$ of $15d. = \frac{45}{32}d. = 1\frac{13}{32}d.$
$\therefore$ $3s.\ 11\frac{1}{4}d. - 1\frac{13}{32}d. = 3s.\ 9\frac{27}{32}d.$

(296) Content $= (26\frac{2}{3} \times 12\frac{3}{4} \times 1)$ cub. ft. $= \frac{80\times51}{3\times4}$ cub. ft.
$= 340$ cub. ft.

(297) $97 \times 25\frac{1}{4}s. = \frac{97\times101}{4}s. = \frac{9797}{4}s. = 2449\frac{1}{4}s. =$ £122. 9*s*. 3*d*.

(298) 1 man can mow 1 acre in $\frac{60\times14}{35}$ hr.;
3 men can mow 24 acres in $\frac{60\times14\times24}{3\times35}$ hr., or, 192 hr.;
$\therefore$ they will do it in 16 days of 12 hours each.

(299) 3 times third son's share + £1575 + £5000 + £1575
= £17900;
$\therefore$ 3 times third son's share = £9750;
$\therefore$ third son had £3250; the second £4825; the eldest £9825.

(300) (i) $\frac{7\times15\times3\times16\times2}{8\times7\times4\times9\times5} = \frac{32}{32} = 1$;
(ii) $\dfrac{\frac{8}{7}\times\frac{14\times7}{3\times24}\times\frac{12}{7}\times\frac{5}{8}}{1+\frac{2}{3}} = \dfrac{\frac{5}{3}}{\frac{5}{3}} = 1$.

(301) $\frac{7}{8} \times \frac{2}{9} \times 21s. = \frac{49}{12}s. = 4s.\ 1d.$;
$\frac{3237}{3\times20\times112} = \frac{1079}{20\times112} = \frac{1079}{2240}$.

(302) $\frac{\cdot0001}{\cdot00002} = \frac{10}{2} = 5$;
$\frac{1000}{\cdot0001} = \frac{10000000}{1} = 10000000$:
$\frac{1}{900} + \frac{1}{9990} = \frac{9990}{900} = 11\cdot1$.

(303) $\cdot175 \times 20$ cwt. $= 3\cdot5$ cwt. $=$ 3 cwt. 2 qr.;
$\cdot006785 \times 560d. = 3\cdot7996d.$

(304) They lose $\frac{295}{960}$ of £4608, or, £$\frac{295\times48}{10}$, or, £1416.

(305) Area of surface $= (4 \times 24 \times 2 + 2 \times 2 \times 2)$ sq. ft.
$= 200$ sq. ft.;
cubical content $= 24 \times 2 \times 2 = 96$ cub. ft.

(306)

$$\begin{array}{r|l} & 30712\cdot5625\ (\ 175\cdot25 \\ & 1 \\ \hline 27 & 207 \\ & 189 \\ \hline 345 & 1812 \\ & 1725 \\ \hline 3502 & 8756 \\ & 7004 \\ \hline 35045 & 175225 \\ & 175225 \\ \hline \end{array}$$

also, $\sqrt{\frac{625}{2401}} = \frac{25}{49}$;

$\therefore$ first result is $\frac{17525}{100} \times \frac{25}{49} = \frac{17525}{196} = 89\frac{81}{196}$.

$$\sqrt{\frac{133225}{10000000000000}} = \frac{365}{1000000} = \cdot000365$$

(307) Interest $= \frac{125 \times 2\frac{1}{2} \times 4}{100}$ gui. $= 12\frac{1}{2}$ gui. $=$ £13. 2*s.* 6*d.*;

P. W. $= \frac{100}{106\frac{1}{4}}$ of 1275*s.* $= \frac{400\times1275}{425}s. = 1200s. =$ £60;

$\therefore$ discount is £3. 15*s.*

(308) $(\frac{112}{15} + \frac{18}{5}) \div (\frac{112}{15} - \frac{18}{5}) = \frac{166}{75} \div \frac{58}{75} = \frac{166}{58} = 2\frac{25}{29}$.

(309) Area of 6 sides $= 2\,(3\frac{1}{3} \times 4\frac{1}{6} + 3\frac{1}{3} \times 2\frac{1}{12} + 4\frac{1}{6} \times 2\frac{1}{12})$ sq. ft.;
$= 2\,(\frac{125}{9} + \frac{125}{18} + \frac{625}{72})$ sq. ft. $= \frac{2125}{36}$ sq. ft.;
$\therefore$ cost $= \frac{2125\times13}{72}d. = 383\frac{49}{72}d. =$ £1. 11*s.* $11\frac{49}{72}d.$

(310) 7 men and 9 women $=$ 7 men and $\frac{81}{16}$ men, or, $\frac{193}{16}$ men;
now 1 man can do the work in (144×9) days;
$\therefore$ $\frac{193}{16}$ men can do the work in $\frac{144\times9\times16}{193}$ da., or, $107\frac{85}{193}$ da.

(311) Selling price of 100 is $\frac{100}{8} \times 2\frac{1}{2}d. = \frac{250}{8}d. = 31\frac{1}{4}d.$;
$\therefore$ on an outlay of 66*d.* there is a loss of $34\frac{3}{4}d.$;
on an outlay of 1*d.* there is a loss of $\frac{139}{4 \times 66}d.$;
on an outlay of 100*d.* there is a loss of $\frac{139 \times 25}{66}d.$, or, $52\frac{43}{66}d.$

(312) ·7, ·28, ·056, are in the proportion of 700, 280, 56, or, 25, 10, 2;
$\therefore$ *A* gets $\frac{25}{37}$ of £1220, or, £824. 6*s.* $5\frac{31}{37}d.$;
B gets $\frac{10}{37}$ of £1220, or, £329. 14*s.* $7\frac{5}{37}d.$;
C gets $\frac{2}{37}$ of £1220, or, £65. 18*s.* $11\frac{1}{37}d.$

(313) 1 mi. 1 fur. 7 po. = 367 po.; 41 mi. 2 fur. 12 po. = 13212 po.;
$\therefore$ time $= \frac{13212 \times 20}{367}$ min. = (36 × 20) min. = 12 hr.

(314) From midnight on Sunday to 4 P.M. on Wednesday are 64 hours;
$\therefore$ the clock gains $\dfrac{64 \times 7\frac{1}{2}}{24}$ min., or, 20 min.;
$\therefore$ it marks 4 hr. 32 min.

(315) Amount of stock $= £\frac{1000 \times 100}{96} = £\frac{3125}{3}$
= £1041. 13*s.* 4*d.*;
annual income $= £\frac{1000 \times 4}{96} = £\frac{1000}{24} =$ £41. 13*s.* 4*d.*

(316) (·00125 × 2240 + ·0125 × 112 + ·025) lb.
= (2·8 + 1·4 + ·025) lb. = 4·225 lb.;
$\frac{4 \cdot 225}{65} = \frac{\cdot 845}{13} = \cdot 065.$

(317) $\frac{2}{16} \times \left(1 - \frac{1350}{9990}\right) = \frac{2 \times 8640}{16 \times 9990} = \frac{54}{333} = \frac{6}{37}.$

(318) 36 cwt. 3 qr. 9 lb. = 4125 lb.; 66 cwt. = (66 × 112) lb.;
$\therefore$ cost $= \frac{50 \times 66 \times 112}{4125}s. = \frac{448}{5}s. =$ £4. 9*s.* 7·2*d.*

(319) 33 + 7 + 5 = 45;
$\therefore$ of nitre there is $\frac{33}{45}$ of 30 lb., or, 22 lb.;
of charcoal there is $\frac{7}{45}$ of 30 lb., or, $4\frac{2}{3}$ lb.;
of sulphur there is $\frac{5}{45}$ of 30 lb., or, $3\frac{1}{3}$ lb.

(320)

$$\begin{array}{l|rcrcll}
 & \pounds & & s. & & d. & \\
 & 2645 & . & 5 & \cdot & 0 & = \text{cost at } \pounds 1 \text{ each.} \\
 & & & & & 2 & \\
\hline
10s. = \frac{1}{2} \text{ of } \pounds 1. & 5290 & . & 10 & . & 0 & = \text{cost at } \pounds 2 \text{ each.} \\
2s.\,6d. = \frac{1}{4} \text{ of } 10s. & 1322 & . & 12 & . & 6 & = \ldots\ldots\ 10s. \text{ each.} \\
5d. = \frac{1}{6} \text{ of } 2s.\,6d. & 330 & . & 13 & . & 1\frac{1}{2} & = \ldots\ldots\ 2s.\ 6d. \text{ each.} \\
 & 55 & . & 2 & . & 2\frac{1}{4} & = \ldots\ldots\ 5d. \text{ each.} \\
\hline
 & \pounds 6998 & . & 17 & . & 9\frac{3}{4} & = \text{cost at } \pounds 2.\ 12s.\ 11d. \text{ each.}
\end{array}$$

(321) Interest $= \dfrac{38475 \times 4\frac{3}{4} \times 3\frac{3}{19}}{100 \times 12}d. = \frac{38475 \times 19 \times 60}{100 \times 12 \times 4 \times 19}d.$

$= \frac{7695}{16}d.$;

also, since $\dfrac{4\frac{3}{4} \times 3\frac{3}{19}}{12} = \frac{19 \times 60}{4 \times 19 \times 12} = \frac{5}{4}$;

P. W. $= \dfrac{100}{100\frac{5}{4}}$ of $38475d. = \frac{400 \times 38475}{405}d. \doteq 38000d.$;

$\therefore$ difference required $= (\frac{7695}{16} - 475)d. = 5 \cdot 9375d.$

(322)

$$\begin{array}{r|l}
 & 173889\,(\,417 \\
 & 16 \\
\hline
81 & 138 \\
 & 81 \\
\hline
827 & 5789 \\
 & 5789 \\
\hline
\end{array}$$

$\sqrt{134\frac{155}{169}} = \sqrt{\frac{22801}{169}} = \frac{151}{13} = 11\frac{8}{13}$.

(323) Area of floor $= (10\frac{2}{3} \times 7\frac{1}{3})$ sq. yd. $= \frac{32 \times 22}{9}$ sq. yd.;
length of carpet $= \frac{32 \times 22 \times 4}{9 \times 3}$ yd.;
cost of carpet $= \frac{32 \times 22 \times 4 \times 54}{27}d. = \pounds 23.\ 9s.\ 4d.$

(324) $2 + \frac{2}{5} + \frac{1}{3} + \frac{1}{6} + \frac{11}{30} = 2 + \frac{12 + 10 + 5 + 11}{30} = 3\frac{4}{15}$;
$\frac{4 \times 7}{5 \times 2} \div \frac{4 \times 12}{13 \times 5} = \frac{4 \times 7 \times 13 \times 5}{5 \times 2 \times 4 \times 12} = \frac{91}{24} = 3\frac{19}{24}$.

(325) $\dfrac{\frac{3}{5} \times \frac{15}{2} \times \frac{33}{2}}{220} = \frac{9 \times 33}{4 \times 220} = \frac{27}{80}$;
$(1 \cdot 05625 \times 80)d. = 84 \cdot 5d. = 84\frac{1}{2}d.$

(326)

	£	s.	d.
	960	0	0
			2
4*s*. is $\frac{1}{5}$ of £1	1920	0	0
4*d*. is $\frac{1}{12}$ of 4*s*.	192	0	0
$\frac{1}{2}$*d*. is $\frac{1}{8}$ of 4*d*.	16	0	0
	2	0	0
	£2130	0	0

(327)

	£	s.	d.
	2	13	4
			3
	8	0	0
			7
2 ro. is $\frac{1}{2}$ of 1 ac.	56	0	0
1 ro. is $\frac{1}{2}$ of 2 po.	1	6	8
5 po. is $\frac{1}{8}$ of 1 ro.		13	4
		1	8
	£58	1	8

(328) $(9\frac{3}{5} \times 3\frac{3}{4}) \div 12 = \frac{48 \times 15}{5 \times 4 \times 12} = 3$;

$\therefore$ P. W. $= \frac{100}{103}$ of £$68\frac{2}{3}$ = £$\frac{100 \times 206}{103 \times 3}$ = £66. 13*s*. 4*d*.

(329) To get £5 income in the first stock I must invest £$\frac{95 \times 5}{4\frac{3}{4}}$, or, £100;

$\therefore$ the first stock is the best to invest in;

also, 19*d*. is the income tax on £$4\frac{3}{4}$;

$\therefore$ £4. 13*s*. 5*d*. is the income from investing £95;

$\therefore$ £613. 12*s*. is the income from investing £$\frac{95 \times 147264}{1121}$, or, £12480.

(330)

$$\begin{array}{r|l} & 5345344\,(\,2312 \\ & 4 \\ \hline 43 & 134 \\ & 129 \\ \hline 461 & 553 \\ & 461 \\ \hline 4622 & 9244 \\ & 9244 \\ \hline \end{array}
\qquad
\begin{array}{r|l} & 1\cdot600000\,(\,1\cdot264\ldots \\ & 1 \\ \hline 22 & 60 \\ & 44 \\ \hline 246 & 1600 \\ & 1476 \\ \hline 2524 & 12400 \\ & 10096 \\ \hline & 2304 \end{array}$$

(331)

(*a*)

	£	s.	d.
4*s*. is $\frac{1}{5}$ of £1	9836	0	0
2*s*. is $\frac{1}{2}$ of 4*s*.	1967	4	0
1*s*. is $\frac{1}{2}$ of 2*s*.	983	12	0
2*d*. is $\frac{1}{6}$ of 1*s*.	491	16	0
$\frac{1}{2}$*d*. is $\frac{1}{4}$ of 2*d*.	81	19	4
	20	9	10
	£3545	1	2

(*β*)

	£	s.	d.
	3	10	7
			12
	42	7	0
			10
	423	10	0
2 qr. is $\frac{1}{2}$ of 1 cwt.	24	14	1
14 lb. is $\frac{1}{4}$ of 2 qr.	1	15	$3\frac{1}{2}$
2 lb. is $\frac{1}{7}$ of 14 lb.		8	$9\frac{7}{8}$
1 lb. is $\frac{1}{2}$ of 2 lb.		1	$3\frac{1}{8}$
			$7\frac{9}{16}$
	£450	10	$1\frac{1}{16}$

(332) (1) $\dfrac{10+\frac{4}{5}-\frac{1}{2}+\frac{1}{11}}{15+\frac{1}{5}-\frac{1}{4}+\frac{7}{11}} = \dfrac{10+\frac{43}{110}}{15+\frac{129}{220}} = \frac{1143\times220}{3429\times110} = \frac{2}{3}$;

(2) $\dfrac{1\cdot802\times7\cdot03}{\frac{20}{9}-\frac{74}{333}} = \frac{12\cdot66806}{2} = 6\cdot33403$.

(333) Since 57 ft. ÷ $12\frac{2}{3}$ ft. = $4\frac{1}{2}$;

∴ height of tower = $(10 \times 4\frac{1}{2})$ ft. = 45 ft.

(334) Cost price = 40*d.*; selling price = 70*d.*;

∴ gain = 30*d.*; gain per cent. = $\frac{100}{40} \times 30 = 75$.

(335)

```
               90306·2601 ( 300·51
               9
         ---------
    6005 |  30626
         |  30025
         ----------
   60101 |   60101
         |   60101
         ----------
```

2

```
                         20|570|824 ( 274
                          8
                          -
 6     7     1200        12570
              469 )
             ---- |      11683     ∴ cube root is 2·74.
             1669 |      -----
               49 )
             ------
81     4   218700         887824
             3256
           ------
           221956         887824
                          ------
```

(336) £490 $= \frac{490 \times 20}{21}$ gui.

$= \frac{490 \times 20 \times 3}{21 \times 2}$ nap.

$= \frac{490 \times 20 \times 3 \times 15}{21 \times 2 \times 4}$ rix-dol.

$= \frac{490 \times 20 \times 3 \times 15 \times 6}{21 \times 2 \times 4 \times 7}$ duc.

= 2250 duc.

(337) The minute-hand gains 35 minute-divisions in $\frac{12 \times 35}{11}$ min.;

∴ the time will be $\frac{420}{11}$ min., or, $38\frac{2}{11}$ min. past 7.

(338) £3 income from bank stock costs $\frac{3}{10}$ of £$234\frac{1}{2}$, or, £70·35;

∴ the bank stock is the better investment.

(339) 1300005001 ; five thousand and thirty millions ninety thousand five hundred and one.

(340) Land-tax for 1 year = $\frac{4}{3}$ of £5. 1*s*. 7$\frac{1}{2}$*d*. = £6. 15*s*. 6*d*.;
∴ net income = £240 − £6. 15*s*. 6*d*. = £233. 4*s*. 6*d*.;
and rate per pound = $\frac{1626}{240}$*d*. = $\frac{54\cdot2}{8}$*d*. = 6·775*d*.

(341) Interest for 1 year = £$\frac{328500\times5}{100}$ = £16425;
interest for 200 days = £$\frac{200\times16425}{365}$ = £(200 × 45)
= £9000.

(342) The gallon contains $\frac{277\cdot274}{1728}$ cub. ft.;
∴ the gallon weighs $\frac{277\cdot274\times1000}{1728}$ oz.;
∴ the pint weighs $\frac{277274}{1728\times8\times16}$ lb. = $\frac{277274}{221184}$ lb.
= 1·2535....lb.

(343) Area of floor = (22$\frac{1}{2}$ × 20$\frac{1}{4}$) sq. ft. = $\frac{45\times81}{8}$ sq. ft.;
∴ cost of carpet = $\frac{45\times81\times66}{9\times8}$*d*. = £13. 18*s*. 5$\frac{1}{4}$*d*.;
area of walls = {(45 + 40$\frac{1}{2}$) × 10$\frac{3}{4}$} sq. ft.
= $\frac{171\times43}{8}$ sq. ft.;
∴ cost of paper = $\frac{171\times43\times10}{9\times8}$*d*. = £4. 5*s*. 1$\frac{1}{4}$*d*.

(344) *A*, and two like *B*, and *C* together do $\frac{1}{8}+\frac{1}{12}$ daily;
A and *B* and *C* together do $\frac{1}{6}$ daily;
∴ two like *A* and two like *B* and two like *C* do $\frac{1}{3}$ daily;
hence *A* and *C* do $\frac{1}{3}-(\frac{1}{8}+\frac{1}{12})$ daily, or, $\frac{3}{24}$ daily;
∴ *A* and *C* do the work in 8 days.

(345) 1 boat takes 1 herring in $\frac{8\times3}{6000}$ days;
∴ 600 boats take (20000 × 700) herrings in $\frac{8\times3\times20000\times700}{600\times6000}$
days, or, 93$\frac{1}{3}$ days.

(346) Amount of interest = £423$\frac{1}{8}$ − £375 = £48$\frac{1}{8}$;
∴ interest on £375 for 1 year = £(48$\frac{1}{8}$ ÷ 3$\frac{2}{3}$) = £$\frac{35\times3}{8}$;
∴ rate per cent. = $\frac{100\times35\times3}{375\times8}$ = 3$\frac{1}{2}$.

(347) 7·75 + 92·25 = 100;
∴ value of tin = £($\frac{775}{10000}\times\frac{35}{80}\times140$) = £$\frac{1519}{320}$;
and value of copper = £($\frac{9225}{10000}\times\frac{35}{80}\times80$) = £$\frac{2583}{80}$;
∴ value of mass = £$\frac{11851}{320}$ = £37. 0*s*. 8*d*. nearly.

(348)

```
       3009007
       5600150
     ---------
     150450350
     3009007
 18054042
15045035
--------------
16850890551050
```

(349) Divisor + 6 times divisor + $\frac{\text{divisor}}{6}$ = 516

∴ 7⅙ times divisor = 516;

∴ divisor = $\frac{516 \times 6}{43}$ = 72;

∴ quotient = 72 × 6 = 432;

and remainder = 72 ÷ 6 = 12;

∴ dividend = 432 × 72 + 12 = 31116.

(350)

```
411355) 1235192 (3
        1234065
        -------
   1127) 411355 (365
         3381
         ----
          7325
          6762
          ----
           5635
           5635
           ----
```

∴ H. C. F. is 1127.

```
2 | 10, 11, 12, 13, 14, 15
  |-----------------------
3 |  5, 11,  6, 13,  7, 15
  |-----------------------
5 |  5, 11,  2, 13,  7,  5
  |-----------------------
  |  1, 11,  2, 13,  7,  1
```

∴ H. C. F. = 30 × 22 × 91 = 60060.

(351) £·60625 = 12·125*s.* = 12*s.* 1½*d.*;

$\frac{142857}{999999}$ of 14*s.* 10½*d.* = $\frac{1}{7}$ of 14*s.* 10½*d.* = 2*s.* 1½*d.*;

$\frac{23}{11}$ of $\frac{3}{71}$ of 781*d.* = 69*d.* = 5*s.* 9*d.*;

∴ sum of the three = £1;

also $\frac{20}{27} = \frac{2\cdot\dot{2}}{3} = \cdot\dot{7}4\dot{0}$.

(352) 161 ÷ 7 = 23; ∴ the number is 23 × 23, or, 529.

(353) In 7½ hr. the clock gains { (7½ × 3½) ÷ 24 } min., or, 1$\frac{3}{32}$ min.;

∴ it must be set at 1$\frac{3}{32}$ min. to 12.

(354) 1 per cent. on £5420 gives £54·2;
∴ income on £9970 at the lower rate is £(453 − 54·2), or, £398·8;
∴ income on £100 at the lower rate is £$\frac{398\cdot8\times100}{9970}$, or, £4;
hence the rates are 4 and 5.

(355) £5. 2*s.* 3*d.* is the interest on £511. 5*s.* for 3 months;
∴ interest on £511·25 for 1 year = £20·45;
∴ rate per cent. = $\frac{2045\times100}{51125}$ = 4.

(356) $\frac{25}{4}\times\frac{25}{4}$ × number of heaps = 53125;
∴ number of heaps = $\frac{53125\times16}{25\times25}$ = 85 × 16 = 1360.

(357) 1 cow is worth £$\frac{17}{4}$;
∴ 20 horses are worth £$(20\times\frac{5}{3}\times\frac{17}{4})$ = £141. 13*s.* 4*d.*

(358) $$\frac{40\div5}{2\cdot42323\dot{2}\dot{3}+3\cdot5765\dot{7}6\dot{5}+2\cdot0\dot{0}0191\dot{1}}=\frac{8}{8}=1.$$

(359)

	£	*s.*	*d.*	
	4 .	14 .	6	= cost of 1 cub. yd.
			9	
9 c. ft. = $\frac{1}{3}$ of 1 c. yd.	42 .	10 .	6	= cost of 9 cub. yd.
9 c. ft. = $\frac{1}{3}$ of 1 c. yd.	1 .	11 .	6	= ...... 9 cub. ft.
3 c. ft. = $\frac{1}{3}$ of 9 c. ft.	1 .	11 .	6	= ...... 9 cub. ft.
432 c. in. = $\frac{1}{12}$ of 3 c. ft.		10 .	6	= ...... 3 cub. ft.
			$10\frac{1}{2}$	= ...... 432 cub. in.
	£46 .	4 .	$10\frac{1}{2}$	= cost of 9 c. yd. 21 c. ft. 432 c. in.

(360)

```
      102·01 ( 10·1
      1
     ______
201 | 201
    | 201
    |______
```

6·24$\dot{9}$ = 6·25 approximately;
∴ √ 6·24$\dot{9}$ = √ 6·25 approximately
= 2·5 approximately.

(361) Area of wall = { (540 + $184\frac{1}{2}$) × $8\frac{1}{3}$ } sq. ft.
= $\frac{1449\times25}{6\times9}$ sq. yd.;
cost of wall = $\frac{1449\times25\times6}{6\times9}$*s.* = £201. 5*s.*

(362) For each £75 invested he gets £3 income;
for each £75 invested he gets £78 money;
for each £78 invested he gets £$\frac{78\times8}{208}$ income, or, £3.

(363) L. C. M. of 2, 3, 4, 5, 6 is 60.
The lowest multiple of 60, which is a perfect square, is 900.

(364) Interest $= £\frac{2733\frac{1}{3}\times4\times3\frac{3}{4}}{100} = £\frac{82\times15}{3} = £410$;
compound interest on £100 for 3 years = £15. 15*s.* 3*d.*;
$\therefore$ sum required $= \frac{100}{115\frac{61}{80}}$ of $£926\frac{1}{10} = £\frac{100\times80\times9261}{9261\times10}$
= £800.

(365) Rent of 1 rood $= \frac{16\times21}{51}$*s.* $= \frac{16\times7}{17}$*s.*;
rent of 288·46875 ac. $= \frac{288\cdot46875\times16\times7\times4}{17}$*s.*
= (16·96875 × 16 × 28)*s.* = 7602*s.* = £380. 2*s.*

(366) $8\cdot3 - 7 - \frac{10\times45\times6}{9\times20\times5} + \frac{5}{2}\times\frac{14}{3} = 1\frac{3}{10} - 3 + \frac{35}{3} = 9\frac{29}{30}$.

(367)

$$\begin{array}{r}
57875 \\
9 \\
\hline
520875 \times 90 \\
4687875 \times 900 \\
42190875 \\
\hline
42238274625
\end{array}
\qquad
\begin{array}{r|l}
7 & 123456 \\
\hline
9 & 17636 \text{ and 4 units over} \\
\hline
 & 1959 \text{ and 35 units over}
\end{array}$$

∴ quotient is 1959, and remainder 39.

(368)

	£	*s.*	*d.*
	7254	13	4
			2
5*s.* is $\frac{1}{4}$ of £1	14509	6	8
2*s.* is $\frac{1}{10}$ of £1	1813	13	4
1*s.* is $\frac{1}{2}$ of 2*s.*	725	9	4
3*d.* is $\frac{1}{4}$ of 1*s.*	362	14	8
$\frac{1}{2}$*d.* is $\frac{1}{6}$ of 3*d.*	90	13	8
	15	2	$3\frac{1}{3}$
	£17516	19	$11\frac{1}{3}$

$$\begin{array}{r}
\text{mi.} \\
3654 \\
7254\frac{2}{3} \\
\hline
3\ \big|\ 7308 \\
\hline
2436 \\
14616 \\
18270 \\
7308 \\
25578 \\
\hline
\text{mi. } 26508552
\end{array}$$

(369) Area of walls $= \{ (28\frac{5}{6} + 27\frac{1}{6}) \times 12\frac{1}{4} \}$ sq. ft. $=686$ sq. ft.;
deductions $= \{ 48 + 13 \times 2\frac{5}{12} + 20 \}$ sq. ft. $= 99\frac{5}{12}$ sq. ft.;
area of paper $= (686 - 99\frac{5}{12})$ sq. ft. $= 586\frac{7}{12}$ sq. ft.;
cost of paper $= \frac{7039 \times 7}{9 \times 12 \times 2}d. = 19s.\ 0\frac{25}{216}d.$

(370) *A*, *A*, *B* and *C* can do $\frac{1}{4} + \frac{5}{23}$ daily;
B and *C* can do $\frac{4}{23}$ daily;
∴ *A* and *A* can do $\frac{1}{4} + \frac{1}{23}$, or, $\frac{27}{92}$ daily;
∴ *A* can do the work in $6\frac{22}{27}$ days;
∴ *B* can do $\frac{1}{4} - \frac{27}{184}$, or, $\frac{19}{184}$ daily;
∴ *B* can do the work in $9\frac{13}{19}$ days;
∴ *C* can do $\frac{4}{23} - \frac{19}{184}$, or, $\frac{13}{184}$ daily;
∴ *C* can do the work in $14\frac{2}{13}$ days.

(371) *M* has 12 miles start. *N* gains 4 miles an hour on *M*, and overtakes him at the end of 3 hours, when each has gone 30 miles from *C*. *N* then gains 24 miles on *M*, and this he can do in 6 hours. Hence the distance from the place where *N* overtakes *M* to *D* is 60 miles. Hence the whole distance is 90 miles.

(372) $\frac{14}{12} \times 5 = \frac{35}{6} = 5\frac{5}{6}$;
∴ P. W. $= \dfrac{100}{105\frac{5}{6}}$ of £1161. 11*s.* 3*d.* = £1097. 10*s.* $9\frac{57}{127}d.$;
∴ discount = £1161. 11*s.* 3*d.* − £1097. 10*s.* $9\frac{57}{127}d.$
= £64. 0*s.* $5\frac{70}{127}d.$;
interest = £$\frac{1475 \times 5 \times 7}{100 \times 4 \times 2}$ = £64. 10*s.* $7\frac{1}{2}d.$;
∴ difference = £64. 10*s.* $7\frac{1}{2}d.$ − £64. 0*s.* $5\frac{70}{127}d.$
= 10*s.* $1\frac{241}{254}d.$

(373) The L. C. M. of 3, 2, 5 being 30, suppose the woman buys 30 apples of each sort;
she pays 10*d.* + 15*d.*, or, 25*d.*;
she gets $\frac{60 \times 2}{5}d.$, or, 24*d.*;
∴ on an outlay of 25*d.* she loses 1*d.*;
∴ on an outlay of 100*d.* she loses 4*d.*

(374)				
		5		198|155|287
				125
	15	8	7500	73155
			1264	
			8764	70112
			64	
	174	3	1009200	3043287
			5229	
			1014429	3043287

(375)	tons	cwt.	qr.	lb.	
	45	14	2	5	
				10	
	457	5	1	22	for 10
				10	
	4572	14	1	24	for 100
				2	
	9145	8	3	20	for 200
	228	12	2	25	for 5
	9374	1	2	17	

(376)		
	2	34, 51, 52, 425, 1200
	2	17, 51, 26, 425, 600
	3	17, 51, 13, 425, 300
	17	17, 17, 13, 425, 100
	25	1, 1, 13, 25, 100
		1, 1, 13, 1, 4

∴ L. C. M. is 265200.

(377)

$$\begin{array}{r|rcrcrl}
 & \pounds & & s. & & d. & \\
 & 7865 & . & 0 & . & 0 & \\
 & & & & & 3 & \\
\hline
6d. \text{ is } \frac{1}{40} \text{ of } \pounds 1 & 23595 & . & 0 & . & 0 & \text{at } \pounds 3 \text{ each} \\
 & 196 & . & 12 & . & 6 & \text{at } 6d. \text{ each} \\
\hline
 & 23398 & . & 7 & . & 6 & \text{at } \pounds 2.\ 19s.\ 6d. \text{ each.}
\end{array}$$

(378) *C* does $\frac{1}{90}$ daily;
B does $\frac{1}{60} - \frac{1}{90}$, or, $\frac{1}{180}$ daily;
A does $\frac{1}{45} - \frac{1}{180} - \frac{1}{90}$, or, $\frac{1}{180}$ daily;
∴ the three would have done $\frac{1}{90} + \frac{1}{180} + \frac{1}{180}$, or, $\frac{4}{180}$ daily;
∴ they would have done it in 45 days.

(379) Interest for 2 months is £1;
∴ P. W. = $\pounds\frac{100 \times 100}{101}$;
∴ discount = $\pounds(100 - \frac{100 \times 100}{101}) = \pounds\frac{100}{101} = 19s.\ 9\frac{63}{101}d.$;
again, since the discount is the interest on the P. W.,
interest on £99 is £1 for 2 months;
interest on £100 is $\pounds\frac{100 \times 6}{99}$ for 1 year, or, $\pounds 6\frac{2}{33}$.

(380) $645 \cdot 16 + 605 \cdot 16 - 1249 \cdot 68 + \cdot 36 = 1$.

(381) $6 + 4 = 10$;
and $\frac{3}{5}$ of £31. 17*s.* 6*d.*, or, £19. 2*s.* 6*d.* is one share;
∴ $\frac{2}{5}$ of £31. 17*s.* 6*d.*, or, £12. 15*s.* is the other share.

(382) Cost price = $\frac{100}{93}$ of £41. 17*s.*, or, £45.

(383) 1 centimètre = ·010936 yd.;
= (·010936 × 36) in. = ·393696 in.
= ·3937 in. nearly.

(384)

$$\begin{array}{r}
6 \cdot 2777777\dot{7} \\
18 \cdot 65165\dot{1}6\dot{5} \\
12 \cdot 345454\dot{5}\dot{4} \\
\hline
37 \cdot 2\dot{7}4883\dot{9}7
\end{array}
\qquad\qquad
\begin{array}{r}
\cdot 3402\dot{7} \\
\cdot 2777\dot{7} \\
\hline
\cdot 0625
\end{array}$$

(385) $407\frac{1}{2} \times 80d. = 32630d. = £135.\ 19s.\ 2d.$

(386) Cost price $= \frac{100}{91}$ of £182 = £200;
selling price should have been $\frac{107}{100}$ of £200, or, £214.

(387) Content of two longer sides $= (2 \times 4 \times 2 \times \frac{1}{12})$ c. ft.
$= \frac{4}{3}$ c. ft.;
content of two shorter sides $= (2 \times 2\frac{5}{6} \times 2 \times \frac{1}{12})$ c. ft.
$= \frac{17}{18}$ c. ft.;
content of bottom $= (3\frac{5}{6} \times 2\frac{5}{6} \times \frac{1}{12})$ c. ft. $= \frac{391}{432}$ c. ft.;
∴ whole content $= \frac{576+408+391}{432}$ c. ft. $= \frac{1375}{432}$ c. ft.;
∴ cost $= \frac{12}{11}$ of $\frac{1375 \times 9}{432 \times 27}s. = \frac{125}{108}s. = 1s.\ 1\frac{8}{9}d.$

(388) Weekly receipts = £3135. 12s. + £261. 6s.
= £3396. 18s.;
∴ weekly gain = £3396. 18s. − £1396. 19s.
= £1999. 19s.;
∴ gain for 364 days = £2000 × 52 − 52s. = £103997. 8s.;
and, if the 365th day be a week-day, gain for the year
= £104520;
∴ reserve = £104520 − £100000 = £4520.

```
(389)          8                    674|526|133
                                    512
                                    ───
        24     7       19200        162526
                        1729 ⎫
                       ───── ⎬      146503
                       20929 ⎪      ──────
                          49 ⎭
                       ───────
       261     7       2270700       16023133
                         18319
                       ───────
                       2289019       16023133
                                     ────────
```

(390) First interest = £$\frac{625\times2\times9}{100\times3\times2}$ = £$\frac{25\times3}{4}$ = £18. 15*s.*;
second interest = £$\frac{1875\times1\times3}{100\times3}$ = £18·75 = £18. 15*s.*

(391) $\frac{17}{24} = \frac{17\times7\times73}{24\times7\times73} = \frac{8687}{24\times7\times73}$, the least;
$\frac{35}{49} = \frac{5}{7} = \frac{5\times24\times73}{24\times7\times73} = \frac{8760}{24\times7\times73}$, the greatest;
$\frac{52}{73} = \frac{52\times24\times7}{24\times7\times73} = \frac{8736}{24\times7\times73}$.

(392) 30 per cent. on 57*d.* = $\frac{171}{10}$*d.* = 17·1*d.*;
∴ retail price = (57 + 17·1)*d.* = 6*s.* 2$\frac{1}{10}$*d.*

(393) $\frac{27\cdot72}{8\cdot1} = \frac{277\cdot2}{81} = \frac{30\cdot8}{9} = 3\cdot4\dot{2}$;
$\frac{27\cdot72}{\cdot081} = \frac{27720}{81} = \frac{3080}{9} = 342\cdot\dot{2}$.

(394) $\frac{340}{12000} = \frac{\cdot34}{12} = \frac{\cdot17}{6} = \cdot028\dot{3}$.

(395) P. W. = $\frac{100}{101\cdot5}$ of £1031·85 = £$\frac{206370}{203}$
= £1016. 12*s.* 0$\frac{48}{203}$*d.*

(396) Here we have to find the L. C. M. of 1, 2, 3, 4, 5, 6, 7, 8, which is the same as the L. C. M. of 5, 6, 7, 8, that is, 840;
hence the bells will be tolling together in 840 sec., or, 14 min.

(397) Volume left = ($6\frac{1}{4} \times 4\frac{5}{12} \times 4\frac{1}{6}$) c. ft. = 115 c. ft. 30 c. in.

(398) 22 men dig (420 × 5 × 3) cub. yd. in (350 × 9) hr.;
∴ 1 man digs 1 cub. yd. in $\frac{350\times9\times22}{420\times5\times3}$ hr., or, 11 hours;
∴ 252 men dig (210 × 3 × 2) cub. yd. in $\frac{210\times3\times2\times11}{252}$ hr., or, 55 hours;
∴ they will take 5 days.

(399) Interest for 4th year = £926·1 × $\frac{5}{100}$ = £46·305;
interest for 5th year = £972·405 × $\frac{5}{100}$
= £48·62025;
∴ amount = £1021·02525 = £1021. 0*s.* 6·06*d.*

(400) 30 men and 10 boys can reap 130 acres in 4 days;
14 men and 10 boys can reap 66 acres in 4 days;
∴ 16 men can reap 64 acres in 4 days;
∴ 1 man can reap 1 acre in 1 day;
∴ 2 boys can reap 1 acre in 2 days;
∴ 1 boy can reap $\frac{1}{4}$ acre in 1 day;
hence in 1 day 2 men and 2 boys can reap $2\frac{1}{2}$ acres;
∴ in 4 days they will reap 10 acres.

(401)
£ s. d.
127) 7817 . 12 . $10\frac{1}{2}$ (£61
762
197
127
70
20
1412 (11*s.*
1397
15
12
190 (1*d.*
127
63
4
254 (2*q.*
254

(402)
4*s.* $11\frac{3}{4}$*d.* = 239*q.*
4*s.* $10\frac{1}{2}$*d.* = 234*q.*
∴ number of ducats = $\frac{55926 \times 234}{239}$
= 234 × 234 = 54756.

(403)
$\frac{2\times3\times2}{3\times4}$*s.* + $\frac{4\times7\times5}{5\times8}$*s.* = 4*s.* 6*d.*;
$\frac{4\cdot5}{20} = \frac{\cdot45}{2} = \cdot225.$

(404)
9·86260440 (3·1404...
9
61 | 86
61
624 | 2526
2496
62804 | 300440
251216

(405) 1 pint of water weighs $\frac{146\cdot17}{8}$ oz. troy,
or, $\frac{146\cdot17}{8\times12}$ lb. troy, or, $\frac{146\cdot17\times5760}{8\times12\times7000}$ lb. avoirdupois;
hence 1 cub. in. of water weighs $\frac{146\cdot17\times5760}{8\times12\times7000\times34\cdot66}$ lb. avoirdupois;
∴ 1 cub. ft. of water weighs $\frac{146\cdot17\times5760\times1728}{8\times12\times7000\times34\cdot66}$ lb. avoirdupois,
or, $\frac{14617\times72\times144}{700\times3466}$ lb. avoirdupois,
or, $\frac{14617\times36\times72\times16}{350\times1733}$ oz. avoirdupois,
or, $\frac{606196224}{606550}$ oz. avoirdupois, or, 999·4....oz. avoirdupois.

(406) Area of each grass plot = (66×36) sq. ft.;
∴ area covered by grass = $\frac{66\times36\times4}{9}$ sq. yd. = 1056 sq. yd.;
area of whole court = (50×30) sq. yd. = 1500 sq. yd.;
∴ cost of grass = £$\frac{1056\times3}{20}$ = £158. 8*s.*;
cost of stones = £$\frac{444\times9\times20}{12\times20}$ = £333;
∴ whole cost = £491. 8*s.*

(407) 6 minutes will be the difference between the clocks at the end of 12 hours; and ∴ $16\frac{1}{2}$ min. will be the difference at the end of $\frac{16\frac{1}{2}\times12}{6}$ hr., or, 33 hr.

Hence the true time will be 9 o'clock on Tuesday evening, by which time the fast goer will have gained $(4 + 4 + 3)$ min., or, 11 min., and the slow goer will have lost $(2 + 2 + 1\frac{1}{2})$ min., or, 5 min. 30 sec.;
∴ the times marked will be 9 hr. 11 min. and 8 hr. 54 min. 30 sec.

(408) Call a coin of each respectively C_1 and C_2;
then $\frac{1}{12}$ of C_1 is silver and $\frac{11}{12}$ of C_1 is gold;
and $\frac{23}{24}$ of C_2 is gold;
then, since $\frac{1}{16}$ of $\frac{1}{12} = \frac{1}{192}$;
value of C_1 : value of C_2 $= 46 \times (\frac{11}{12}+\frac{1}{192}) : 88\frac{1}{2}\times\frac{23}{24}$;
$= \frac{46\times177}{192} : \frac{177\times23}{48}$;
$= \frac{2}{4} : 1 = 2 : 4 = 1 : 2.$

(409) P. W. = $\frac{100}{101\frac{1}{2}}$ of £690·2 = £$\frac{100\times2\times690\cdot2}{203}$ = £680;

∴ discount = £690. 4*s.* − £680 = £10. 4*s.*

(410) M. P. = $\sqrt{\{\cdot6\times\cdot024\}} = \sqrt{\cdot0144} = \cdot12$.

(411) $\frac{6s.\ 4d.\ 3\frac{2}{9}q.}{7} = 10d.\ 3\frac{8}{9}q.$;

$\frac{2\times37}{3\times24}d. = \frac{37\times4}{3\times12}q. = \frac{37}{9}q. = 4\frac{1}{9}q.$;

∴ $10d.\ 3\frac{8}{9}q. + 4\frac{1}{9}q. = 1s.$

(412) $\frac{\cdot000108}{270} = \frac{\cdot0000108}{27} = \cdot000004$;

$\frac{62500}{\cdot25} = \frac{6250000}{25} = 250000$;

$\frac{2\cdot64}{\cdot32} = \frac{264}{32} = \frac{66}{8} = 8\cdot25$.

(413) On £80 he gets £6 annually;

∴ on £100 he gets £$\frac{6\times100}{80}$, or, £$\frac{60}{8}$, or, £$7\frac{1}{2}$;

amount of Turkish stock = £$\frac{5000\times100}{80}$;

money from sale of stock = £$\frac{5000\times100\times104}{80\times100}$ = £6500;

also since £90 invested in railway shares gives an income of £$4\frac{1}{2}$,

new income = £$\frac{6500\times4\frac{1}{2}}{90}$ = £325;

but first income = £$\frac{5000\times6}{80}$ = £375;

∴ he has £50 less income.

(414) For £1 I can buy $\frac{155}{178\cdot25}$ yd.;

∴ for £74·875 I can buy $\frac{155\times74875}{178250}$ yd., or, 65·108...yd.

(415) $\frac{\frac{7}{4}-\frac{3}{4}}{\frac{1}{2}+5\frac{1}{2}} \div \frac{1}{6} - \left\{\frac{10}{21} + \frac{4}{21} - \frac{10}{63}\right\} \div \frac{4}{7}$

$= \frac{1}{6} \div \frac{1}{6} - \frac{32}{63} \times \frac{7}{4} = 1 - \frac{8}{9} = \frac{1}{9}$.

(416) 1 man can do the work in (14 × 6 × 8 × 20) hr.;

24 men can do the work in $\frac{14\times6\times8\times20}{24}$ hr., or, (14 × 2 × 20) hr.;

∴ number of weeks = $\frac{14\times2\times20}{5\times7}$ = 16.

(417) The rates of the trains are as 6 : 7, because the quick train goes as far in 6 hours as the slow train goes in 7 hours.

Also the quick train gains 5 miles an hour on the slow train, because it would take 2 hours to gain the 10 miles.

Hence the rates are 30 miles and 35 miles an hour.

(418) Area of walls $= \{(40\frac{3}{4}+22\frac{1}{4}) \times 12\frac{1}{2}\}$ sq. ft. $= \frac{63 \times 25}{2}$ sq. ft.;
length of paper $= (\frac{63 \times 25}{2 \times 9} \times \frac{8}{5})$ yd. $= 140$ yd.;
cost of paper $= \frac{140 \times 9}{4}$*d.* = £1. 6*s.* 3*d.*

(419) 2 per cent. on *A*'s capital is £220;
∴ *A*'s capital is £$\frac{220 \times 100}{2}$ = £11000;
∴ *B* and *C*'s capital = $\frac{3}{2}$ of £11000 = £16500;
∴ capital of each is £8250.

(420)

	5		159837789483
			125
15	4	7500	34837
		616	
		8116	32464
		16	
162	2	874800	2373789
		3244	
		878044	1756088
		4	
1626	7	88129200	617701483
		113869	
		88243069	617701483

(421) He sells $\frac{2 \times 160}{3}$ lb. for $\frac{320 \times 8}{3}$*d.*, or, $853\frac{1}{3}$*d.*;
he has to sell $\frac{160}{3}$ lb. for £$6\frac{1}{4}$ − $853\frac{1}{3}$*d.*, or, $646\frac{2}{3}$*d.*;
∴ price per lb. $= (\frac{1940}{3} \div \frac{160}{3})$*d.* $= 12\frac{1}{8}$*d.*

(422) $\frac{3\cdot 5}{15\times 20\times 4} = \frac{\cdot 7}{240} = \frac{\cdot 07}{24} = \frac{\cdot 0175}{6} = \cdot 00291\dot{6}$;
$\frac{12600}{99900}$ of 111*d.* = $\frac{126}{9}$*d.* = 1*s.* 2*d.*

(423) $\frac{5}{8}$ of the debt is £25 ; ∴ the debt is £$\frac{25\times 8}{5}$, or, £40.

(424) The shares are in the ratio 4 × 10 × 1 : 12 × 3 × 2 : 20 × 3 × 1, or, 40 : 72 : 60;
∴ *A*'s share = $\frac{40}{172}$ of £43 = £10;
B's share = $\frac{72}{172}$ of £43 = £18;
C's share = $\frac{60}{172}$ of £43 = £15.

(425) The cubic content of a brick in the second case is $(\frac{4}{5})^3$ of that of a brick in the first case. Hence we may leave the exact dimensions of the first bricks out of account, and reason thus:
cost of the 100 bricks = 100 × $\frac{64}{125}$ × $\frac{12200}{9760}$*d.* = 64*d.*
= 5*s.* 4*d.*

(426) Number of years = $\frac{100}{3\frac{1}{3}} = \frac{100\times 3}{10}$ = 30.

(427) Cash to be realised = £10000;
∴ stock to be sold = £$\frac{100\times 10000}{90}$ = £$\frac{100000}{9}$ = £11111$\frac{1}{9}$.

(428) At 11 o'clock the hands are 5 minute-spaces apart, and at particular positions of the minute-hand between 11 and 12 the integral number of minute-spaces, reckoned from left to right, between the hands will be successively 6, 7......59, or, in all 54.

(429) *A* walks 20 mi. in 220 min.;
∴ *B* walks 20 mi. in 265 min.;
∴ *B*'s rate is $\frac{265}{20}$ min., or, 13$\frac{1}{4}$ min. per mile.
Again, *A* walks 5 mi. in 55 min.;
B walks 5 mi. in 66$\frac{1}{4}$ min.;
∴ *A* wins by 11$\frac{1}{4}$ min., and by (11$\frac{1}{4}$ ÷ 13$\frac{1}{4}$) mi., or, $\frac{45}{53}$ mi.

(430) $\frac{1}{4} \times 3 + \frac{1}{2} \times$ (number of months when the remainder should be paid) $= 4\frac{1}{2}$;

$\therefore$ $\frac{1}{2} \times$ (number of months required) $= 4\frac{1}{2} - \frac{3}{4} = \frac{15}{4}$;

$\therefore$ number of months $= \frac{30}{4} = 7\frac{1}{2}$.

(431) In 400 consecutive years there are 100 − 3, or, 97 leap years;

$\therefore$ number of times $= 400 \times 11 + 97 = 4497$.

(432) The parts are as 6, 4, 3, 2; and the sum of these is 15; also $\frac{1}{15}$ of £16. 17*s.* 6*d.* = £1. 2*s.* 6*d.*;

$\therefore$ the parts are £6. 15*s.*; £4. 10*s.*; £3. 7*s.* 6*d.*; £2. 5*s.*

(433) 2 mi. 5 fur. 9 po. 1 ft. 6 in. = 4670 yd.;

$\therefore$ fraction $= \frac{5}{11}$ of $\frac{7 \times 40 \times 5\frac{1}{2}}{4670} = \frac{5 \times 7 \times 40 \times 11}{11 \times 4670 \times 2} = \frac{70}{467}$.

(434) $10 \cdot 375 \times \cdot 0074 = \cdot 076775$;

$1 \cdot \dot{2}\dot{7} \times \cdot 0458 = \frac{126}{99} \times \frac{458}{10000} = \frac{1603}{11 \times 2500} = \cdot 0582\dot{9}\dot{0}$;

$\frac{1080}{\cdot 008} = \frac{1080000}{8} = 135000$;

$\frac{123000}{99900} \div \frac{360}{99} = \frac{123 \times 99}{999 \times 360} = \frac{451}{1332} = \cdot 33\dot{8}5\dot{8}$.

(435) In 60 minutes the second wheel revolves $60 \times \frac{360}{100} \times 20$, or, 4320 times;

also, thread wound $= \frac{4320 \times 5 \times 11}{1760 \times 3}$ mi. = 45 mi.

(436) He bought at $\frac{100}{110}$ of 99, or, 90;

his income was $\frac{3}{99}$ of £15345, or, £465.

(437) Cubic content of tank $= (8 \times 5\frac{1}{3} \times 4\frac{1}{2})$ cub. ft.

= 192 cub. ft.;

weight of water in tank $= \frac{192 \times 1000}{16}$ lb., or, 12000 lb.;

quantity of water in tank $= \frac{4 \times 12000}{5 \times 8}$ gall. = 1200 gall.

Next, net efflux per minute $= (7 - 4\frac{1}{2})$ gall., or, $2\frac{1}{2}$ gall.;

$\therefore$ time in which 300 gall. flow out $= (300 \div 2\frac{1}{2})$ min.

= 120 min. = 2 hr.

(438) His gain is $\frac{931}{49}$ quarters, or 19 quarters;
and since on each qr. he gains $\frac{1}{9}$ qr. from one tenant,
and $\frac{1}{10}$ qr. from the landlord,
∴ rent is $19 \div (\frac{1}{9} + \frac{1}{10})$ qr., or 90 qr.

(439) First, when the minute hand is between 2 and 3;
number of minutes past $3 + \frac{1}{12}$ (number of minutes past 3) $= 15$;
∴ $\frac{13}{12}$ of number of minutes past $3 = 15$;
∴ number of minutes past $3 = \frac{12 \times 15}{13} = 13\frac{11}{13}$.
Secondly, when the hands are together between 3 and 4,
number of minutes past $3 - \frac{1}{12}$ (number of minutes past 3) $= 15$;
∴ $\frac{11}{12}$ of number of minutes past $3 = 15$;
∴ number of minutes past $3 = \frac{12 \times 15}{11} = 16\frac{4}{11}$.

(440) Cubic content of water $= (12\frac{2}{3} \times 12\frac{2}{3} \times 3\frac{3}{4})$ cub. ft.
$= \frac{19 \times 19 \times 5}{3}$ cub. ft.;
wt. of water $= \frac{1805000}{3}$ oz. $=$ 16 tons 15 cwt. 3 qr. $2\frac{2}{3}$ oz.

(441) Number of years $= 100 \div 2\frac{1}{2} = \frac{200}{5} = 40$.

(442) 3 men can reap 20 ac. in 121 hr.;
1 man can reap 1 ac. in $\frac{121 \times 3}{20}$ hr.;
9 men can reap $\frac{360 \times 320}{4840}$ ac. in $\frac{121 \times 3 \times 360 \times 320}{9 \times 20 \times 4840}$ hr.;
∴ they take 48 hours, and they have to work 4 days.

(443) Cubic content of water drawn from upper canal
$= (118 \times 660 \times 48 \times \frac{1}{12})$ cub. ft.;
cubic content of water in the lock $= (80 \times 12 \times \frac{17}{2})$ cub. ft.;
∴ number of barges $= \frac{118 \times 660 \times 4}{80 \times 6 \times 17} = \frac{649}{17} = 38\frac{3}{17}$;
∴ 38 barges can pass through.

(444) $$\frac{1}{\frac{29 \times 36}{4 \times 11} + \frac{36}{11}} \div \left(\frac{27 - 26}{117}\right) - \frac{27}{6} \div \frac{2 \times 3 \times 63}{3 \times 8}$$
$$= \frac{11}{297} \times \frac{117}{1} - \frac{27 \times 4}{6 \times 63} = \frac{117}{27} - \frac{2}{7} = 4\frac{1}{21}.$$

(445) $\frac{81}{99}$ of £$14\frac{2}{3}$ = £$\frac{9\times44}{11\times3}$ = £12 ;
$\frac{8181}{10000}$ of £$14\frac{2}{3}$ = £$\frac{8181\times44}{10000\times3}$ = £11·9988
= £11. 19*s.* 11·712*d.* ;
fraction = $\frac{12-11\cdot9988}{12}$ = $\frac{\cdot00012}{12}$ = ·0001 = $\frac{1}{10000}$.

(446) P. W. = $\frac{100}{108}$ of £2358 = £$2183\frac{1}{3}$;
∴ income from gas shares = $\frac{9}{144}$ of £$2183\frac{1}{3}$
= £136. 9*s.* 2*d.* ;
rate per cent. = $\frac{136\frac{11}{24}}{2183\frac{1}{3}}$ of 100 = $\frac{3275\times100}{6550\times8}$ = $6\frac{1}{4}$.

(447) *A* can make 50 when *B* makes 45 ;
A can make 50 when *C* makes 40 ;
∴ *B* can make 90 when *C* makes 80 ;
∴ *B* can give *C* 10 points in 90.

(448) $\frac{11}{23}$ + $\frac{2}{3}$ of $\frac{12}{23}$ = $\frac{11}{23}$ + $\frac{8}{23}$ = $\frac{19}{23}$;
hence $\frac{4}{23}$ of the boys = 8 ;
∴ number of boys = $\frac{23\times8}{4}$ = 46.

(449)
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                  5290455·409801 ( 2300·099
                  4
                 ___
       43     |  129
              |  129
              |_________________
   460009     |      4554098
              |      4140081
              |_________________
  4600189     |      41401701
              |      41401701
              |_________________
```

(450) Interest for 5 years on £1250 = £$281\frac{1}{4}$ = £$\frac{1125}{4}$:
interest for 1 year on £1250 = £$\frac{225}{4}$;
interest for 1 year on £100 = £($\frac{225}{4}$ ÷ $12\frac{1}{2}$) = £$\frac{9}{2}$
= £$4\frac{1}{2}$.

'451) £11. 18*s.* $7\frac{1}{2}$*d.* = 5487 half-pence ;
£502. 19*s.* 6*d.* = 241428 half-pence ;
∴ number of times = $\frac{241428}{5487}$ = 44.

(452) $\frac{1}{3}[3 + \frac{1}{4}\{3 + \frac{1}{3} \text{ of } \frac{9}{2}\}] \div \frac{125}{1000}$

$= \frac{1}{3}[3 + \frac{1}{3} \text{ of } \frac{9}{2}] \div \frac{1}{8} = (\frac{1}{3} \text{ of } \frac{9}{2}) \times 8 = 12.$

(453)

$$\begin{array}{r}
79{\cdot}347 \\
23{\cdot}15 \\
\hline
396735 \\
79347 \\
238041 \\
158694 \\
\hline
1836{\cdot}88305
\end{array}
\qquad
\begin{array}{l}
464\,)\,178{\cdot}986144\,(\,{\cdot}385746 \\
1392 \\
\overline{3978} \\
3712 \\
\overline{2666} \\
2320 \\
\overline{3461} \\
3248 \\
\overline{2134} \\
1856 \\
\overline{2784} \\
2784 \\
\overline{}
\end{array}$$

(454)

$$\begin{array}{r|l}
12 & 3{\cdot}25 \\
\hline
3 & 15{\cdot}2708\dot{3} \\
\hline
7 & 5{\cdot}0902\dot{7} \\
\hline
 & {\cdot}727\dot{1}825396\dot{}
\end{array}$$

$\cdot 72718\!\!\dot{}\,25396\!\!\dot{}$

${\cdot}0\dot{9}$ of £5 = £$\frac{9 \times 5}{90}$ = 10*s*.

(455) $\frac{5}{6}$ of the remainder after the battle was 60000;

∴ the remainder was $\frac{60000 \times 6}{5}$, or, 72000;

∴ whole army was 72000 + 12000, or, 84000.

(456) £90 invested will produce an income of £3;

∴ sum to be invested = $\frac{90}{3}$ of £2000 = £60000.

(457) In 40 feet the fore wheel revolves 5 times, and the hind wheel 4 times; hence the fore wheel makes 1 more revolution than the hind wheel in 40 feet;

∴ distance required is (40 × 100) ft., or, 4000 ft.

(458) Five gallons of brandy are worth 150*s*.;

five gallons of brandy and one gallon of water are worth 150*s*., which is at the rate of 25*s*. per gall. for the mixture;

hence 100 gallons of brandy and 20 gallons of water will make a mixture worth 25*s*. a gallon.

(459) The quick train runs 5 miles while the slow train runs 3 miles;

∴ distance run by slow train = $\frac{3}{5}$ of distance run by quick train;

∴ distance run by quick train = $\frac{3}{5}$ of distance run by quick train + 100 miles;

∴ $\frac{2}{5}$ of distance run by quick train = 100 miles;

∴ quick train has run $\frac{5 \times 100}{2}$ miles, or, 250 miles;

and slow train has run $\frac{3}{5}$ of 250 miles, or, 150 miles;

∴ the distance is 400 miles.

(460) In first stock I have to pay £$92\frac{5}{8}$ for £$3\frac{1}{4}$ income;

∴ for £$3\frac{1}{2}$ income I have to pay £$\frac{92\frac{5}{8} \times 3\frac{1}{2}}{3\frac{1}{4}}$, or, £$99\frac{3}{4}$;

∴ the first stock is the better investment.

(461) $\frac{1}{4} + \frac{1}{5} + \frac{1}{6} = \frac{15+12+10}{60} = \frac{37}{60}$;

∴ $\frac{23}{60}$ of the number = 161;

∴ the number = $\frac{161 \times 60}{23}$ = 420.

(462) $\frac{\frac{22}{7}}{\frac{39}{5} \times \frac{3}{4}} \times \frac{\frac{13}{28}}{\frac{45}{56}}$ of £9 = $\frac{22 \times 5 \times 4 \times 13 \times 56}{39 \times 3 \times 7 \times 28 \times 45}$ of £9

= £$\frac{22 \times 8 \times 9}{3 \times 3 \times 7 \times 9}$ = £$\frac{176}{63}$ = £2. 15*s.* $10\frac{10}{21}$*d.*

(463)

```
273) 1719·9 (6·3              6·3000 ( 2·50...
     1638                     4
     ────                    ┌────
      819                 45 │230
      819                    │225
      ───                    ├────
                         500 │ 500
```

(464) Number of cub. ft. = $56\frac{2}{3} \times 19\frac{1}{2} \times 2\frac{1}{2} = \frac{170 \times 39 \times 5}{3 \times 2 \times 2}$
= $2762\frac{1}{2}$.

(465) Price required = $\frac{3\frac{1}{2}}{3} \times 75 = \frac{7 \times 75}{2 \times 3} = 87\frac{1}{2}$.

(478) 1 woman = $\frac{3}{4}$ of a man; 1 boy = $\frac{3}{5}$ of a man;
1 girl = $\frac{1}{2}$ of a man;
∴ 1 man + 2 women + 3 boys + 4 girls
= $(1 + \frac{3}{2} + \frac{9}{5} + 2)$ men = $\frac{63}{10}$ men.
Since then 3 men can do the work in 60 days;
1 man can do the work in 180 days;
$\frac{63}{10}$ men can do the work in $\frac{1800}{63}$ days, or, $28\frac{4}{7}$ days.

(479) Area of horizontal section of each pier = $(3\cdot14159 \times \frac{225}{4})$ sq. ft.;
∴ pressure = $(750 \times 144 \times 3\cdot14159 \times \frac{225}{4})$ tons
= 19085159·25 tons.

(480) $69\frac{1}{2}$ miles = $(69\frac{1}{2} \times 1760)$ yds. = $(\frac{139 \times 880 \times 32}{35})$ mètres
= $111835\frac{3}{7}$ mètres.

(481) $\frac{5}{3}$ of the sum = 30*d.*; ∴ the sum = $\frac{3 \times 30}{5}$*d.*, or. 1*s.* 6*d.*

(482) $\frac{5714280}{9999990} \times \frac{63}{99} = \frac{63492}{111111} \times \frac{7}{11} = \frac{5772}{15873} = \cdot\dot{3}\dot{6}$.

(483)

```
·0438 ) 41·06328 ( 937
        3942
        ----
         1643
         1314
         ----
          3292
          3066
          ----
           2268
```

∴ remainder is ·02268 of an inch.

(484) The cube root of 50·653 is 3·7;
hence length of external edge = 3·7 ft. + $1\cdot\dot{3}$ in. + $1\cdot\dot{3}$ in.
= $(44\cdot4 + 2\cdot\dot{6})$ in. = $47\cdot0\dot{6}$ in. = 3 ft. $11\frac{1}{15}$ in.

(485) For £$91\frac{1}{8}$ he gets an income of £2. 18*s.* 9*d.*, or, 705*d.*;
∴ for £8063 he has an income of $\frac{8063 \times 705 \times 8}{729}$*d.*
= £259. 18*s.* $4\frac{100}{243}$*d.*

(486) £16. 15*s.* 3*d.* = 4023*d.*; and 2*s.* 3*d.* = 27*d.*;

.. number of square feet of wainscot = 4023 ÷ 27 = 149;

∴ number of feet in circuit of room = $\frac{149}{2}$.

Now 62 + 87 = 149, and hence we find

length of room = $\frac{87}{4}$ ft., and breadth = $\frac{62}{4}$ ft.;

∴ cost of carpet = $(\frac{87\times62}{4\times4}\times\frac{144}{27}\times\frac{54}{36})$*d.* = £11. 4*s.* 9*d.*

(487) In 1 minute *A* runs $(2\frac{1}{3} \div 16\frac{4}{5})$ miles;

in 34 minutes *A* runs $\frac{7\times5\times34}{3\times84}$ miles, or, $\frac{5\times17}{18}$ miles;

in 34 minutes *B* runs $(\frac{18}{17}$ of $\frac{5\times17}{18})$ miles, or, 5 miles;

∴ length of course is $(2\frac{1}{3} + 5)$ miles, or, $7\frac{1}{3}$ miles.

(488) In 10 minutes the boat is carried back $\frac{10}{60}$ of 2 miles, or, $\frac{1}{3}$ mile;

∴ $\frac{10}{60}$ of rate of boat per hour in still water = $(1\frac{1}{4}+\frac{1}{3})$ miles;

∴ $\frac{1}{6}$ of rate = $\frac{19}{12}$ miles; ∴ rate = $9\frac{1}{2}$ miles;

hence in usual state of stream the boat goes 9 miles an hour against the stream, and ∴ it goes $1\frac{1}{4}$ miles in $8\frac{1}{3}$ minutes.

(489) Volume of cistern = $(12\times2\frac{1}{3}\times\frac{9}{12})$ cub. ft. = 21 cub. ft.;

volume of a sheet of paper = $\frac{8\times6}{300}$ cub. in.;

∴ number of sheets = $\frac{21\times1728}{2} \div \frac{8\times6}{300}$ = 113400.

(490) (1) The minute-hand has to gain 10 minute-divisions on the hour hand, and this it will do in $\frac{10\times12}{11}$ min., or, $10\frac{10}{11}$ min.

(2) The minute-hand has to gain 40 minute-divisions on the hour-hand, and this it will do in $\frac{40\times12}{11}$ min., or, $43\frac{7}{11}$ min.

(491) $(\frac{3}{8}$ of $\frac{14}{9}$ of $1760\times\frac{32}{35})$ mèt. = $\frac{2\times352\times4}{3}$ mèt. = $938\frac{2}{3}$ mèt.

(492) Number of times = $\frac{1760\times3}{2\times6\cdot28}$ = $\frac{66000}{157}$ = $420\frac{60}{157}$.

(493) 5 per cent. is 1 shilling in the £;

∴ he has 218*d.* left out of 240*d.*;

∴ original income = $\frac{240}{218}$ of £545 = £$\frac{240\times5}{2}$ = £600.

(494) Interest = £$\frac{455 \times 4}{100 \times 4}$ = £4·55 = £4. 11*s*

P. W. = $\frac{100}{101}$ of £455;

∴ discount = £$\frac{455}{101}$ = £4. 10*s*. $1\frac{19}{101}$*d.*;

∴ difference is $10\frac{82}{101}$*d.*

(495) 4*s*. $3\frac{3}{5}$*d.* = 5·42 fr., or, $\frac{258}{5}$*d.* = $\frac{542}{100}$ fr.;

∴ 1*d.* = $\frac{542 \times 5}{100 \times 258}$ fr.;

∴ £1 = $\frac{542 \times 5 \times 240}{100 \times 258}$ fr. = $\frac{1084}{43}$ fr. = $25\frac{9}{43}$ fr.

(496) He may ride for $\frac{1}{3}$ of 5 hours, because he can then walk back in $\frac{2}{3}$ of 5 hours;

∴ he may ride $\frac{50}{3}$ miles, or, $16\frac{2}{3}$ miles.

(497) On each £90 invested in Russian Stock he gets £$\frac{4 \times 90}{100}$ income, or, £3·6;

∴ he gains £·6 income on each £90 Russian Stock;

∴ amount of Russian Stock = £$\frac{90 \times 200}{\cdot 6}$ = £$\frac{180000}{6}$

= £30,000.

(498) Call the place where the trains meet *M*;

the distance from *L* to *M* = 4 × rate of slow train in miles per hour;

distance from *N* to *M* = 1 × rate of quick train in miles per hour;

$$\therefore \frac{4 \times \text{rate of slow train}}{1 \times \text{rate of quick train}} = \frac{\text{distance from } L \text{ to } M}{\text{distance from } N \text{ to } M};$$

$$\text{but } \frac{\text{rate of slow train}}{\text{rate of quick train}} = \frac{\text{distance from } N \text{ to } M}{\text{distance from } L \text{ to } M};$$

∴ compounding the ratios (Art. 195),

$$\frac{4 \times (\text{rate of slow train})^2}{(\text{rate of quick train})^2} = 1;$$

∴ 2 × (rate of slow train) = rate of quick train.

(499) *A* and *A* and *B* and *C* do $(\frac{3}{20} + \frac{5}{24})$ daily;
A and *B* and *C* do $\frac{4}{15}$ daily;
∴ *A* can do $(\frac{3}{20} + \frac{5}{24} - \frac{4}{15})$ daily, or, $\frac{11}{120}$ daily;
∴ *A* could do the work in $\frac{120}{11}$ days, or, $10\frac{10}{11}$ days.

(500) £1 = $\frac{4233}{170}$ francs = $\frac{423 \cdot 3}{17}$ fr. = 24·9 fr.;
£1 = $\frac{503 \times 20}{400}$ fr. = $\frac{503}{20}$ fr. = 25·15 fr.

(501) $$\frac{\frac{9}{4}}{\frac{8}{3}} + \frac{7\frac{7}{10}}{12\frac{5}{6}} + \frac{1}{2} + \frac{9}{160} = \frac{27}{32} + \frac{77 \times 6}{77 \times 10} + \frac{1}{2} + \frac{9}{160}$$
$$= \frac{27}{32} + \frac{6}{10} + \frac{89}{160} = \frac{135+96+89}{190} = 2.$$

(502) ·01 × ·000001 = ·00000001;
·01 × 1000000 = 10000;
·000001 × 1000 = ·001.

(503) We have to compare the values of $\frac{14}{73}$ and $\frac{37}{193}$ of equal weights;
now $\frac{14}{73} = \frac{2702}{73 \times 193}$; and $\frac{37}{193} = \frac{2701}{73 \times 193}$;
∴ the former will be the heavier.

(504) £1650 = 3300 half-sovereigns,
= 3300 × $\frac{11}{25}$ darics,
= $\frac{3300 \times 11}{25} \times \frac{80}{3}$ drachmæ,
= $\frac{3300 \times 11 \times 80}{25 \times 3} \times \frac{13}{11}$ denarii = 45760 denarii.

(505) 1 out of 4 parts, or, 5 out of 20 parts in the first glass are spirit;
1 out of 5 parts, or, 4 out of 20 parts in the second glass are spirit;
∴ 9 out of 40 parts of the mixture are spirit;
∴ the ratio is 9 of spirit to 31 of water.

(506) 15 + 18 + 21 + 24 + 27 + 30 + 33 + ...

To make an average of 30, we must take one number to the right of 30 to one equidistant from 30 on the left, and hence we get the number of days 5 + 1 + 5, or, 11;

∴ the number of miles is 330.

(507) 15 men working 9 hours a day can finish the work in 16 days;

∴ to do it in 1 day 1 man must work (15 × 9 × 16) hours;

to do it in 12 days 18 men must work $\frac{15\times 9\times 16}{12\times 18}$ hours, or, 10 hours.

(508) For £$3\frac{1}{4}$ income in the 3 per cents. I must pay

£$\frac{3\frac{1}{4}\times 91\frac{5}{8}}{3}$, or, £$\frac{13\times 733}{4\times 3\times 8}$, or, £$99\frac{35}{96}$;

hence since $\frac{1}{4}$ is less than $\frac{35}{96}$, the second stock is the better investment.

£1 invested in the 3 per cents. gives £$\frac{1\times 3}{91\frac{5}{8}}$ income;

£1 invested in the $3\frac{1}{4}$ per cents. gives £$\frac{1\times 3\frac{1}{4}}{99\frac{1}{4}}$ income;

difference = £$(\frac{13}{397}-\frac{24}{733})$ = £$\frac{1}{291001}$;

∴ amount to be invested = £$\frac{291001}{20}$ = £14550. 1*s.*

```
(509)    60481729 (7777     7                       387420489
         49                                         343
       ------                                       ---------
   147 | 1148        21     2     14700              44420
       | 1029                       424 )
       --------                  ------ |
  1547 |  11917                   15124 }            30248
       |  10829                       4 )
       ----------                ------             --------
 15547 |   108829   216     9   1555200             14172489
       |   108829                 19521
       ----------               -------
                                1574721             14172489
                                                    --------
```

(510) The shorter in 125 years increases $\frac{5}{4}$ of 3·014 in., or, 3·7675 in.;
the longer has to increase (3·7675 − 1·02) in., or, 2·7475 in.;
∴ in 100 years it increases $\frac{4}{5}$ of 2·7475 in., or, 2·198 in.

(511) $\left(\frac{45}{7} \times \frac{62-55}{152-89}\right) \div \frac{1+\frac{3}{7}}{2} = \frac{45\times7}{7\times63} \div \frac{10}{14} = 1.$

(512)
```
36036) 258380 (7
       252252
       ------
         6128) 36036 (5
               30640
               -----
                5396) 6128 (1
                      5396
                      ----
                       732) 5396 (7
                            5124
                            ----
                             272) 732 (2
                                  544
                                  ---
                                  188) 272 (1
                                       188
                    ---------------------
                     84) 188 (2
                         168
                         ---
                          20) 84 (4
                              80
                              --
                               4) 20 (5
                                  20
                                  --
```
∴ 2 and 4 are the numbers.

(513) Area of floor = $(15\frac{1}{2} \times 12\frac{3}{4})$ sq. ft. = $\frac{31\times51}{2\times4}$ sq. ft.;
length of carpet = $\frac{31\times51\times144}{2\times4\times24\times36}$ yd. = $\frac{31\times17}{16}$ yd.;
cost of carpet = $\frac{31\times17\times92}{16}$*d.* = £12. 12*s.* $6\frac{1}{4}$*d.*

(514) Interest = £381. 5*s.* − £375. = £6. 5*s.*;
interest for 1 year on £375 = £$\frac{375\times4}{100}$ = £15;
∴ number of months = $\frac{6\cdot25\times12}{15}$ = $\frac{75}{15}$ = 5.

(515) £1206. 4*s.* 4*d.* = 289492*d.*; and £3. 10*s.* 4*d.* = 844*d.*;
∴ cubic content of the cube = $\frac{289492}{844}$ in. = 343 cub. in.;
∴ edge of cube = $\sqrt[3]{343}$ in. = 7 in.;
∴ superficial area of sides = (6 × 49) sq. in. = 294 sq. in.;
∴ cost of gilding = 147*d.* = 12*s.* 3*d.*

(516) Weight of gold = $\frac{4232267}{3\cdot9}$ oz. troy
= $\frac{42322670\times6}{39\times175}$ lb. avoir. = $3721\frac{1}{35}$ lb. avoir.

(517) *A* can do $\frac{1}{2}$ of the work in an hour;
B can do $\frac{3}{8}$ of the work in an hour;
C can do $\frac{3}{8}$ of the work in an hour;
∴ *A*, *B*, and *C* can do $\frac{10}{8}$ in an hour;
∴ they can do the work in $\frac{8}{10}$ of an hour, or, 48 minutes.

(518) He reads (220 × 28 × 12) lines in $5\frac{1}{2}$ hours;
he reads 1 line in $\frac{11}{2\times220\times28\times12}$ hour;
he reads (400 × 36 × 14) lines in $\frac{11\times400\times36\times14}{2\times220\times28\times12}$ hours,
or, 15 hours.

(519) Distance passed over by train = $\frac{20\times1760\times18}{60\times60}$ yd.
= 176 yd.;
∴ length of bridge = (176 − 120) yd. = 56 yd.

(520) 20 men = 30 women, and 50 children = 30 women;
∴ (30 + 40 + 30) women receive £50 for 1 week's work;
∴ 100 women receive £50, and ∴ 1 woman receives 10*s.*

(521) $\dfrac{\frac{11}{4}-\frac{11}{9}}{\frac{19}{36}+\frac{3}{8}} \div \frac{22}{13} = \frac{55\times72}{65\times36}\times\frac{13}{22} = 1.$

(522)

$$\begin{array}{r|l}
 & 10747\cdot4689\ (\ 103\cdot67 \\
 & 1 \\
\hline
203 & 747 \\
 & 609 \\
\hline
2066 & 13846 \\
 & 12396 \\
\hline
20727 & 145089 \\
 & 145089 \\
\hline
\end{array}$$

	5		189119224
			125
15	7	7500	64119
		1099	
		8599	60193
		49	
171	4	974700	3926224
		6856	
		981556	3926224

(523) Find the L. C. M. of 3, 7, 12, 14, which is 84.

(524) Money obtained from sale = £960 ;
stock purchased = £$\frac{960\times100}{108}$ = £888$\frac{8}{9}$;
first income = £30;
second income = £$\frac{960\times5}{108}$ = £$\frac{400}{9}$ = £44$\frac{4}{9}$;
∴ increase = £14$\frac{4}{9}$ = £14. 8*s*. 10$\frac{2}{3}$*d.*

(525) Length of side = $\frac{945\times1344}{1134}$ yd. = $\frac{1270080}{1134}$ yd.
= 1120 yd.;
acres in each = $\frac{1270080}{4840}$ ac. = $\frac{31752}{121}$ ac. = 262$\frac{50}{121}$ ac.

(526) Cubic content of room = (20 × 16 × 12) c. ft.;
weight of gold = $\frac{20\times16\times12\times19260}{16}$ lb. avoirdupois.
= $\frac{20\times12\times19260\times7000}{5760}$ lb. troy;
value of gold = £$\frac{12\times4\cdot25\times20\times1926\times7000}{48}$
= £286492500.

(527) For every 2 sovereigns in the bag there are 3 half crowns, and therefore 32½ shillings;
now 2 + 3 + 32½ = 37½, and 150 ÷ 37½ = 4;
hence there are 8 sovereigns, 12 half-crowns, and 130 shillings.

(528) *B* walks at the rate of (50 ÷ 12) mi., or, $4\frac{1}{6}$ mi. per hour;
∴ *B* walks 20 miles in (20 ÷ $4\frac{1}{6}$) hr., or $\frac{24}{5}$ hr.;
∴ *A* walks 20 miles in (1 + $\frac{24}{5}$) hr., or, $\frac{29}{5}$ hr.;
∴ *A* walks 50 miles in $\frac{5\times29}{2\times5}$ hr., or, 14½ hr.;
∴ *A* reaches London at 6 hr. 30 min. P.M.

(529) We have to find a common multiple of 5 and 9, which must lie between 80 and 100, and which is therefore 90. Hence the exact amount is 90 cwt., or, 4½ tons.

(530) The first strikes the 7th stroke after $\frac{6\times35}{11}$ sec.;
the second strikes the 7th stroke after $\frac{6\times25}{11}$ sec.;
the difference = $\frac{6\times10}{11}$ sec. = $\frac{1}{11}$ min

(531)
$$\begin{array}{r} 3004072905 \\ 512648 \\ \hline 24032583240 \\ 12016291620 \\ 1922606665920 \\ 15380853273600 \\ \hline 1540031966602440 \end{array}$$

(532) $\frac{2}{31}$ of 961*d.* = 62*d.*;
$\frac{5}{43}$ of 1849*d.* = 215*d.*;
∴ difference = 153*d.* = 12*s.* 9*d.*

	mils.
(533)	2030
	15
2 qr. is $\frac{1}{2}$ of 1 cwt.	30450
1 qr. is $\frac{1}{2}$ of 2 qr.	1015
14 lb. is $\frac{1}{2}$ of 1 qr.	507·5
7 lb. is $\frac{1}{2}$ of 14 lb.	253·75
	126·875
	m. 32353·125

= £32. 3 f. 5 c. 3·125 m.

(534) 3 × breadth × breadth = 30000 sq. yd.;
∴ square of breadth = 10000 sq. yd.;
∴ breadth = 100 yd.;
∴ length = 300 yd.;
hence diagonal = $\sqrt{}$(10000 + 90000) yd.
= 316·2....yd.

(535) The sound comes in 6 seconds from the more distant vessel, and in 4 seconds from the nearer vessel. Hence the distance of the nearer vessel from the person is two-thirds of 2240 yd. Therefore the distance between the vessels is one-third of 2240 yd., or, $746\frac{2}{3}$ yd.

(536) *A* fires 10 times while *B* fires 9 times;
∴ *A* fires 55 times while *B* fires ($5\frac{1}{2} \times 9$) times, or, $49\frac{1}{2}$ times, that is, when *B* has only completed 49 shots;
∴ *B* has still to fire 6 shots.

(537) Money from sale of shares = £($43 \times 11\frac{1}{2}$) = £$\frac{43 \times 23}{2}$;
annual income from stock = £$\frac{43 \times 23 \times 6}{2 \times 128}$ = £$\frac{2967}{128}$
= £23. 3*s*. $7\frac{1}{8}$*d*.

(538) The fast clock goes 1560 min., while the slow clock goes 1550 min.;

∴ while the slow clock goes 2160 min., the fast clock goes $\frac{156}{155}$ of 2160 min., or, $2173\frac{29}{31}$ min.;

∴ it must be put back $13\frac{29}{31}$ min.

(539) $\frac{17}{40} + \frac{8}{19}$ of $\frac{23}{40} = \frac{17}{40} + \frac{184}{760} = \frac{507}{760}$;

∴ $\frac{253}{760}$ of the ore = 506 tons;

∴ amount of ore = $\frac{506\times760}{253}$ tons = 1520 tons.

(540) Annual increase is 1 in 60, and therefore the population of each year is $\frac{61}{60}$ of the population of the preceding year, and so at the end of five years the population will be

$\left(\frac{61}{60}\right)^5$ of 10000000 = $\frac{84459630100}{7776}$ = 10861578 nearly.

(541)

$$\begin{array}{rrrr} \text{tons} & \text{cwt.} & \text{qr.} & \text{lb.} \\ 13\ . & 5\ . & 3\ . & 11 \\ &&& 4 \\ \hline 53\ . & 3\ . & 1\ . & 16 \\ &&& 6 \\ \hline 319\ . & 0\ . & 1\ . & 12 \end{array}$$

(542)

$$\begin{array}{r|rrr} & \text{£} & s. & d. \\ & 65931\ . & 12\ . & 9 \\ &&& 4 \\ \hline 3 & 263726\ . & 11\ . & 0 \\ \hline 9 & 87908\ . & 17\ . & 0 \\ \hline & \text{£}9767\ . & 13\ . & 0 \end{array}$$

(543) Carriage of 1 cwt. for 1 mile costs $\frac{2925}{135\times65}$*s.*;
carriage of 60 cwt. for 180 miles costs $\frac{2925\times6\times18}{135\times65}$*s.*, or, 36*s.*

(544) 1581 darics = $\frac{1581\times17}{16}$ guineas
= $\frac{1581\times17\times24}{16\times19}$ pistoles
= $\frac{1581\times17\times24\times38}{16\times19\times31}$ sequins, or, 2601 sequins.

(545) First 18*s.* is left out of £1;
then from 18*s.* we have to take $\frac{51}{480}$ of 18*s.*, or, $\frac{153}{80}$*s.*

∴ remainder = $\frac{1287}{80}$*s.*;

∴ $\frac{1287}{80}$*s.* remain out of 20*s.*;

∴ £1 remains out of £$\frac{20\times80}{1287}$;

∴ £2574 remain out of £$\frac{20\times80\times2574}{1287}$, or, £3200.

(546) £$91\frac{1}{2}$ produces an income of £$2\frac{7}{8}$;

$\therefore$ for an income of £230 he must invest £$\frac{230 \times 91\frac{1}{2}}{2\frac{7}{8}}$,
or, £7320.

(547) On £100 outlay he claims £160, but receives only three-eighths of £160, that is, £60. Thus he loses 40 per cent.

(548) Breadth of room $= \frac{4875}{20 \times 12 \cdot 5}$ ft. $= \frac{975}{2 \times 25}$ ft. $= 19\frac{1}{2}$ ft.;
area of walls $= \{ (40 + 39) \times 12 \cdot 5 \}$ sq. ft.
$= 987\frac{1}{2}$ sq. ft.;
cost of painting $= 987\frac{1}{2}$ sq. ft. $=$ £4. 2*s*. $3\frac{1}{2}$*d*.

(549) $\cdot 041\dot{6} = \frac{375}{9000}$, and $\cdot 0375 = \frac{375}{10000}$,
and these fractions are in the ratio 10 : 9;
hence 10 × number of inmates at first = 9 × number of inmates at first + 360;
$\therefore$ number of inmates = 360.
Also, since $\frac{375}{9000} = \frac{1}{24}$; number of masters was $\frac{360}{24}$, or, 15,
and $\therefore$ number of boys was 345.

(550) We have to find how far the ordinary train was behind the express, when the train from *B* met the express;
in 20 minutes the train from *B* went over $8\frac{1}{3}$ miles;
in 20 minutes the ordinary train went over $6\frac{2}{3}$ miles;
$\therefore$ the ordinary train was 15 miles behind the express;
now the express had $7\frac{1}{2}$ miles start, and in 45 minutes it would gain $7\frac{1}{2}$ miles more on the ordinary train, hence the express train had been 1 hour on the road when the train from *B* met it. Also, the train from *B* had been 1 hour on the road, and therefore it started at 1 o'clock.

(551) $\frac{3\cdot5}{50} = \frac{7}{100} = \cdot07$.

(552) $(\frac{11}{4} \times \frac{84}{11}) \div \frac{3\times56}{2\times4\times3} = 21 \div 7 = 3$.

(553) Length of circumference $= \frac{360\times1519}{22}$ miles;
diameter $= \frac{360\times1519\times7}{22\times22}$ miles $= 7908\frac{102}{121}$ miles.

(554) Cost of oranges $= \frac{100\times12}{16}d. = 75d.$;
second price $= \frac{100+10\frac{3}{4}}{12}d. = \frac{4300}{12\times4}d. = 89\cdot58\frac{1}{3}d.$;
∴ he saved $14\cdot58\frac{1}{3}d.$

(555) 1800 × number of posts counted in 2 min. = yards passed over in 1 hr.;
1760 × number of miles passed in 1 hour = yards passed over in 1 hr.;
thus, approximately, the statement of the question is true.

(556) $\frac{2}{5}$ of £18550 = £7420;
∴ income from 4 per cents. $= £\frac{7420\times4}{96} = £309.\ 3s.\ 4d.$;
income from 3 per cents. $= £\frac{11130\times3}{90} = £371$;
∴ new income = £680. 3*s*. 4*d*.;
old income $= £\frac{18550\times3\frac{1}{2}}{92\frac{3}{4}} = £700$;
∴ loss is £19. 16*s*. 8*d*.

(557) I can write 300 pages, working $7\frac{1}{2}$ hours a day, in 2 months;

I can write 1 page, working 1 hour a day, in $\frac{2\times7\frac{1}{2}}{300}$ months;

I can write 450 pages, working 9 hours a day, in $\frac{15\times450}{300\times9}$ months;

∴ I can do it in $2\frac{1}{2}$ months.

(558) The shares are as 1, 3, 6, 10, of which the sum is 20;
∴ *A* gets $\frac{1}{20}$ of £$8\frac{1}{3}$, or, $8\frac{1}{3}$*s*., or, 8*s*. 4*d*.;
∴ *B* gets 25*s*., *C* 50*s*., *D* 83*s*. 4*d*.

(559) Cost price $= \frac{100}{92\frac{1}{2}}$ of 37 guin. = £42;
selling price $= \frac{112\frac{1}{2}}{100}$ of £42 = £47·25 = £47. 5*s*.

(560) Area of whole rectangle = (72 × 45) sq. yd.
= 3240 sq. yd.;
area of grass-plots = (4 × 27 × $13\frac{1}{2}$) sq. ft.
= 162 sq. yd.;
∴ area to be gravelled = (3240 − 162 − 36) sq. yd.
= 3042 sq. yd.;
∴ cost = 3042*d*. = £12. 13*s*. 6*d*.;
and depth of pond = (252 ÷ 36) yd. = 7 yd.

(561) $\frac{3663270}{7254} = \frac{407030}{806} = \frac{203515}{403} = 505$;
$\frac{15000000}{32} = \frac{3750000}{8} = 468750$.

(562) $\frac{5 \times 36 \times 4840 \times 9}{66 \times 11}$ sq. ft. = (5 × 6 × 40 × 9) sq. ft.
= 10800 sq. ft.

(563) Annual profit $= \frac{12}{28} \times \frac{7}{2}$ of £3598. 13*s*. 5*d*.
= £5398. 0*s*. $1\frac{1}{2}$*d*.

(564) Cost price $= \frac{100}{112\frac{1}{2}}$ of £1. 18*s*. 3*d*. = £1. 14*s*.

(565) Circuit of room $= \frac{760}{10}$ ft., or, 76 feet, or, (40 + 36) ft.
∴ breadth of room is (36 ÷ 2) ft., or, 18 ft.;
∴ area of carpet = (20 × 18) sq. ft.;
∴ cost of carpet $= \frac{20 \times 18 \times 25}{9 \times 4}$*s*. = £12. 10*s*.

(566) Rent of the estate $= £(15000 \div 25) = £600$;
interest on mortgage $= £\frac{10000 \times 3}{100} = £300$;
sum received by purchaser $= £(600 - 300 - 100)$
$= £200$;
$\therefore$ rate of interest on his investment $= £\frac{200 \times 100}{5000} = £4$.

(567) His gross receipts are decreased 35 per cent. by the fall in flour, and 5 per cent. by the lowering of trade expenses, and therefore 40 per cent. in all. Hence he can lower the price of the 5*d.* loaf 40 per cent., that is by $\frac{5 \times 40}{100}$*d.*, or, 2*d.*

(568) Ratio of costs is as $2 \times 9 \times 7 \times 12 : 1 \times 8 \times 6 \times 10\frac{1}{2}$;
$\therefore$ cost of second vessel $= \dfrac{8 \times 6 \times 10\frac{1}{2}}{2 \times 9 \times 7 \times 12}$ of £6000
$= £2000$.

(569) Interest $= \frac{1}{5}$ of $£\frac{403 \cdot 2 \times 4}{100} = £\frac{80 \cdot 64}{25} = £3 \cdot 2256$;
P. W. $= \dfrac{100}{100\frac{4}{5}}$ of $£403 \cdot 2 = \frac{500}{504}$ of $£403 \cdot 2 = £400$;
$\therefore$ difference $= £3 \cdot 2256 - £3 \cdot 2 = £ \cdot 0256 = 6 \cdot 144$*d.*

(570) Compound interest on £100 for 2 years is £8·16;
$\therefore$ sum required $= £\frac{6 \times 100}{\cdot 16} = £\frac{60000}{16} = £3750$.

(571) Cube of number $= \frac{5 \times 337500}{4} = 421875$;

	7		421875	
			343	
21	5	14700	78875	$\therefore$ number is 75.
		1075		
		15775	78875	

(572) $\frac{\cdot 000215 \times \cdot 0732}{3 \cdot 125} = \frac{\cdot 000015738}{3 \cdot 125} = \cdot 00000503616$.

(573) Interest on £100 is £9;
∴ sum required = $\frac{100}{9}$ of £11. 17*s*. 9*d*. = £132. 1*s*. 8*d*.

(574) 1 lb. of bread when wheat is 1*s*. per bus. should sell
for $\frac{6}{4\frac{1}{2}\times 6}d.$;
150 lb. of bread when wheat is 9*s*. per bus. should sell
for $\frac{150\times 9\times 6}{4\frac{1}{2}\times 6}d.$;
∴ it sells for 300*d*., or, £1. 5*s*.

(575) $\frac{99}{100}$ of a child's share = $\frac{2\times 97}{100}$ of a brother's share;
∴ a brother's share = $\frac{99}{194}$ of a child's share;
hence 5 times a child's share + $\frac{3\times 99}{194}$ times a child's share = £12670;
or, $\frac{1267}{194}$ times a child's share = £12670;
∴ a child's share = £1940, and a brother's share = £990;
and, when the legacy duty has been taken away, each child will receive £1920. 12*s*., and each brother £960. 6*s*.

(576) $\frac{1}{5} + \frac{3}{8} = \frac{23}{40}$;
and ∴ $\frac{17}{40}$ of the estate = 50 acres;
∴ estate = $\frac{40\times 50}{17}$ ac. = $\frac{2000}{17}$ ac. = $117\frac{11}{17}$ ac.

(577) Interest on *B*'s debt to *A* = £$(5 \times 3\frac{1}{4} \times 4)$ = £65;
P. W. of *B*'s claim on *A* = $\frac{100}{103}$ of £320 = £$310\frac{70}{103}$;
∴ *B* has to pay £565 − £$310\frac{70}{103}$, or, £$254\frac{33}{103}$.

(578) Weight of block = $\frac{8\times 2\times 3\times 19\cdot 26\times 1000}{1728}$ oz. = 535 oz.
= 33 lb. 7 oz.

(579) 9 boys are equivalent to 6 men;
∴ since 12 men can do $\frac{3}{4}$ of the work in $6\frac{1}{2}$ hours;
1 man can do $\frac{1}{4}$ of the work in $\frac{13\times 12}{3\times 2}$ hours;
17 men can do $\frac{1}{4}$ of the work in $\frac{26}{17}$ hours,
or, $1\frac{9}{17}$ hours.

(580) Content of cistern = (1000 + 8) cub. in.
= 1008 cub. in.;
area of base = $(\frac{121}{81} - \frac{100}{81})$ sq. ft. = $\frac{21}{81}$ sq. ft.
= $\frac{112}{3}$ sq. in.;
∴ depth = $\frac{1008 \times 3}{112}$ in. = 27 in. = 2 ft. 3 in.

(581) $\dfrac{\frac{3}{5} \text{ of } 21}{20} = \frac{63}{100}$; $\dfrac{247\frac{1}{2}}{1760 \times 36} = \frac{495}{1760 \times 72} = \frac{1}{256}$.

(582)

$$\begin{array}{r|l} 2 & 8,\ 9,\ 20,\ 21,\ 22 \\ \hline 2 & 4,\ 9,\ 10,\ 21,\ 11 \\ \hline 3 & 2,\ 9,\ 5,\ 21,\ 11 \\ \hline & 2,\ 3,\ 5,\ 7,\ 11 \end{array}$$

∴ L. C. M. is 27720.

(583) £1. 16*s.* 8*d.* = 440*d.*, and therefore he buys at the rate of $\frac{440}{112}$*d.*, or, $\frac{55}{14}$*d.* per lb. Hence on an outlay of $\frac{55}{14}$*d.* he gains $(\frac{9}{2} - \frac{55}{14})$*d.*, or, $\frac{4}{7}$*d.*;
∴ his gain per cent. is $\frac{4 \times 100 \times 14}{55 \times 7}$, or, $\frac{160}{11}$, or, $14\frac{6}{11}$.

(584) 7 men can mow 22 acres in 88 hours;
1 man can mow 1 acre in $\frac{88 \times 7}{22}$ hr., or, 28 hr.;
12 men can mow 360 acres in $\frac{28 \times 360}{12}$ hr., or, 840 hr.;
∴ they can do the work in 84 days.

(585) Number of bricks = $\dfrac{18729 \times 15 \times 12 \times 18}{9 \times 4\frac{1}{2} \times 3}$ = 499440.

(586) $\frac{1}{4}$ of a ton is 560 lb.;
$\dfrac{4\frac{1}{5}}{100}$ of 20000*d.* is 840*d.*;
∴ duty per lb. = $\frac{840}{560}$*d.* = $1\frac{1}{2}$*d.*

(587) Cost price of a quarter of the mixture = $\frac{4}{5}$ of 57*s.* 6*d.*
= 46*s.*;
thus on each quarter of the cheaper I gain 7*s.*;
and on each quarter of the dearer I lose 2*s.*;
∴ I must mix them in the ratio 2 : 7.

(588) 20 per cent. of the wheat grown in the country
= 10000000 quarters;
∴ wheat grown = (5 × 10000000) quarters = 50000000 quarters.

(589) His rate with the stream is $4\frac{1}{2}$ miles per hour;
his rate against the stream is $1\frac{1}{2}$ miles per hour;
∴ his rate in still water = (6 ÷ 2) miles per hour, or, 3 miles per hour;
∴ rate of the stream is $1\frac{1}{2}$ miles per hour.

(590) Money from sale of 3 per cents. = (£200 × $94\frac{1}{2}$)
= £18900;
interest from bank stock = £$\frac{18900 \times 8\frac{1}{2}}{225}$ = £714;
and, since his original income was £600, he gains £114.

(591)
$$\frac{\frac{11 \times 2 \times 18}{2 \times 9 \times 7} - 1 + \frac{7}{10}}{1 - \frac{3}{14} \text{ of } \left\{\frac{1}{2} + \frac{1}{2} \text{ of } \frac{\frac{1}{20}}{\frac{3}{20}}\right\}} = \frac{\frac{22}{7} - \frac{10}{7}}{1 - \frac{3}{14} \text{ of } \left\{\frac{1}{2} + \frac{1}{6}\right\}}$$
$$= \frac{\frac{12}{7}}{1 - \frac{4}{28}} = 2.$$

(592) $\frac{110}{1100} = \frac{1}{10} = \cdot 1.$

(593) Area of floor = (14 × $12\frac{1}{2}$) sq. ft. = 175 sq. ft.;
area covered by carpet = ($\frac{23}{2} \times \frac{29}{3}$) sq. ft. = $111\frac{1}{6}$ sq. ft.;.
floor cloth required = (175 − $111\frac{1}{6}$) sq. ft., or, $63\frac{5}{6}$ sq. ft.;
cost of floor cloth = $\frac{383 \times 6}{6 \times 9}$*s.* = £2. 2*s.* $6\frac{2}{3}$*d.*

(594) With £500 he can gain £50 in 7 months;
with £1 he can gain £1 in $\frac{7 \times 500}{50}$ months;
with £385 he can gain £$60\frac{1}{2}$ in $\frac{7 \times 121 \times 500}{50 \times 385 \times 2}$ months, or, 11 months.

(595) Rent of an acre = rent of $\frac{100}{247}$ hectares
$= \frac{100 \times 130}{247}$ francs
$= £\frac{100 \times 130}{247 \times 25}$, or, $£\frac{40}{19}$, or, £2. 2*s*. $1\frac{5}{19}$*d.*

(596) P. W. = $\frac{100}{103}$ of £193. 2*s*. 6*d.* $= £\frac{100 \times 1545}{103 \times 8}$ = £187. 10*s.*

(597) *A*, *B* and *C* do $\frac{1}{4}$ of the work daily ;
A and *B* do $\frac{1}{6}$ of the work daily ;
B and *C* do $\frac{1}{8}$ of the work daily ;
∴ *A* does $\frac{1}{4} - \frac{1}{8}$, or, $\frac{1}{8}$ daily ;
C does $\frac{1}{4} - \frac{1}{6}$, or, $\frac{1}{12}$ daily ;
∴ *A* and *C* can do $\frac{1}{8} + \frac{1}{12}$ daily, or, $\frac{5}{24}$ daily ;
∴ they can do the work in $\frac{24}{5}$ days, or, $4\frac{4}{5}$ days.

(598) 460 + 805 + 391 = 1656 ;
∴ first farmer employs $\frac{460}{1656}$ of 72 men, or, 20 men ;
second farmer employs $\frac{805}{1656}$ of 72 men, or, 35 men ;
third farmer employs $\frac{391}{1656}$ of 72 men, or, 17 men.

(599) Cost price = $\frac{100}{92}$ of £38. 5*s*., or, $£\frac{3825}{92}$;
now $57 - \frac{3825}{92} = \frac{1419}{92}$;
∴ gain per cent. $= \frac{1419 \times 100}{3825} = \frac{1892}{51} = 37\frac{5}{51}$.

(600) 1 grain of gold is in content $\frac{1728}{1215 \times 24 \times 20 \times 12}$ cub. in. ;
thickness of the leaf $= \frac{1728}{1215 \times 24 \times 20 \times 12 \times 56}$ in. ;
number of leaves $= \frac{1215 \times 24 \times 20 \times 12 \times 56}{1728 \times 400} = 567$.

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$$\frac{1}{\cdot 0625} = \frac{10000}{625} = \frac{400}{25} = 16.$$

(602)

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                    ------
   108     4        388800
                      4336
                    ------
                    393136         1572544
                                   1572544
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(603) 2470 in. of copper $= \frac{2470\times17}{13}$ in. of iron

$= \frac{2470\times17\times16}{13\times15}$ in. of tin

$= \frac{2470\times17\times16\times12}{13\times15\times19}$ in. of zinc

$= 2176$ in.

(604) P. W. of 6*s*. 10*d*. $= \frac{100}{102\frac{1}{2}}$ of 82*d*. = 80*d*. = 6*s*. 8*d*.

(605) Stock purchased in 3 per cents. $= £\frac{3000\times100}{80}$;

money from sale of this stock $= £\frac{3000\times84}{80}$;

income from first investment $= £\frac{3000\times3}{80} = £\frac{900}{8}$

$= £112\frac{1}{2}$;

income from second investment $= £\frac{3000\times84\times3\frac{1}{2}}{80\times96\frac{1}{4}}$

$= £114\frac{6}{11}$;

∴ increase $= £2\frac{1}{22} = £2.\ 0s.\ 10\frac{10}{11}d.$

(606) In 1 day 1 acre can be reaped by $\frac{16 \times 8}{152}$ men;
in 12 days 228 acres can be reaped by $\frac{10 \cdot \times 8 \cdot \times 228}{12 \times 152}$ men,
or, 16 men.

(607) £1. 4*s*. $6\frac{1}{2}$*d*. = 589 halfpence = £$\frac{589}{480}$;
amount of £1 for 1 quarter at $\frac{589}{480}$ per cent. = £$\frac{48589}{48000}$;
∴ at end of 1 year the amount is £$\left(\frac{48589}{48000}\right)^4$, or,
£$\frac{5573715940860228241}{5308416000000000000}$ = £$\frac{557}{530}$ nearly
= £$\frac{105}{100}$, nearly, which is the amount of £1 at 5 per cent. simple interest. (See Art. 178.)

(608) 1 mile = (1760 × 36) in. = $\frac{63360}{39 \cdot 371}$ mètres
= 1609·306... mètres.

(609) $9\frac{3}{4}$*d*. = 39 farthings, and 1*s*. = 48 farthings;
the L. C. M. of 39 and 48 is 624, and hence 16 francs = 13 shillings;
taking the multiples of 16 and 13 successively, we find that the multiple of 16, which is greater by 27 than the same multiple of 13, is 144; hence the sum required is 117*s*., or, £5. 17*s*.

(610) The L. C. M. of 26, 18 and 15 is 1170, and hence the piers are vertically above each other at intervals of 1170 ft., or, 390 yd.;
if the ends of the bridge are reckoned as two of the three places in which the piers coincide, length of viaduct = (4 + 390 + 4 + 390 + 4) yd. = 792 yd.;
if the ends are not reckoned as two of the coincidences, length of viaduct = (390 + 4 + 390 + 4 + 390 + 4 + 390) yd. = 1572 yd.

(611) $$\cfrac{1}{1+\cfrac{1}{2+\cfrac{1}{3+\frac{5}{21}}}}+\cfrac{1}{5+\cfrac{1}{4+\cfrac{1}{3+\frac{1}{3}}}}$$

$$=\cfrac{1}{1+\cfrac{1}{2+\frac{21}{68}}}+\cfrac{1}{5+\cfrac{1}{4+\frac{3}{10}}}=\cfrac{1}{1+\frac{68}{157}}+\cfrac{1}{5+\frac{10}{43}}$$

$$=\tfrac{157}{225}+\tfrac{43}{225}=\tfrac{200}{225}=\tfrac{8}{9}.$$

(612) P. W. = $\left(\frac{100}{103{\cdot}5}\right)^2$ of £374. 18*s.* $6\frac{9}{10}$*d.*;
= $\frac{10000}{10712{\cdot}25}$ of $89982\frac{9}{10}$*d.* = 84000*d.* = £350.

(613) 4466 sq. ft. 100 sq. in. = 643204 sq. in.;
∴ side = $\sqrt{}$ 643204 in. = 802 in. = 66 ft. 10 in.

(614) Divide in the proportion of 10, 64, 24, or, 5, 32, 12;
the men get $\frac{5}{49}$ of £4089. 9*s.* 2*d.* = £417 5*s.* 10*d.*;
the women get $\frac{32}{49}$ of £4089. 9*s.* 2*d.* = £2670. 13*s.* 4*d.*;
the boys get $\frac{12}{49}$ of £4089. 9*s.* 2*d.* = £1001. 10*s.*

(615) Money to be invested in second stock = £$\frac{276{\cdot}75\times96}{4{\cdot}5}$;
∴ stock to be sold = £$\frac{276{\cdot}75\times96\times100}{4{\cdot}5\times92{\cdot}25}$ = £$\frac{3\times9600}{4{\cdot}5}$
= £6400.

(616) $\frac{857142}{999999}$ of £10. 14*s.* 1*d.* = $\frac{6}{7}$ of £10. 14*s.* 1*d.*
= £9. 3*s.* 6*d.*;
also, ·85714 of 2569*d.* = 2201·99266*d.*, which differs from 2202*d.* by less than ·008*d.*, that is, $\frac{1}{125}$*d.*

(617) 1 lb. of coffee = $\frac{2}{11}$ lb. of tea
= $\frac{2\times25}{11\times3}$ lb. of sugar
= $\frac{2\times25\times77}{11\times3\times112}$*s.* = 1*s.* $0\frac{1}{2}$*d.*

(618) £400 for 3 months gives the same interest as £100 for 1 year, and since the rate is double that on the £327, the interest at the end of the year will be the same as the interest for a year on £327 + £200 at the smaller rate ;

∴ smaller rate = $\frac{100}{527}$ of £13·175 = £2·5 ;

∴ the rates are $2\frac{1}{2}$ and 5 per cent.

(619) A gallon of the mixture costs him $\frac{100}{120}$ of 3*s.*, or 2*s.* 6*d.* ; now 2*s.* 6*d.* is $\frac{5}{8}$ of 4*s.*, and therefore $\frac{3}{8}$ of a gallon of the mixture is water, that is, there are 3 pints of water in each gallon.

(620)	1		7·000000000 1
3	9	300 351 651 81	6000 5859
57	1	108300 571 108871 1	141000 108871
573	2	10944300 11464 10955764	32129000 21911528 10217472

∴ cube root is 1·912...

(621) $\cdot 58\dot{3} = \frac{525}{900} = \frac{21}{36} = \frac{7}{12}$;

$\frac{7}{12}$ of 65 dwt. = $\frac{7 \times 65 \times 24}{12}$ gr. = 910 gr.

(622) Cost of 250 sheep = $\frac{100}{116\frac{2}{3}}$ of £532. 5*s.* 10*d.* = £456. 5*s.* ;

cost of each sheep = $\frac{9125}{250}$*s.* = 36·5*s.* = £1. 16*s.* 6*d.*

(623) For £$2\frac{1}{8}$ during (5 × 20) hours we can have 25 burners;
for £1 during 1 hour we can have $\frac{25 \times 5 \times 20 \times 8}{17}$ burners;
for £$7\frac{13}{20}$ during (4 × 30) hours we can have
$\frac{153 \times 25 \times 5 \times 20 \times 8}{20 \times 4 \times 30 \times 17}$ burners, that is 75 burners.

(624) £16. 10*s*. is the interest on £550;
∴ rate of interest = $\frac{4}{3}$ of $\frac{100}{550}$ of £$16\frac{1}{2}$ = £4 per cent.

(625) The broker first offered $\frac{9}{10}$ of the value;
then $\frac{9}{10}$ of the value + £379·75 = $\frac{105\frac{1}{2}}{100}$ of the value;
∴ £379·75 = $(\frac{211}{200} - \frac{9}{10})$ of the value = $\frac{31}{200}$ of the value;
∴ the value = $\frac{200}{31}$ of £379·75 = £2450.

(626) For 3*s*. $9\frac{1}{2}$*d*. he gets at first $\frac{91}{13}$, or, 7 quarterns;
for 3*s*. $9\frac{1}{2}$*d*. he gets afterwards $\frac{91}{14}$, or, $6\frac{1}{2}$ quarterns;
∴ they must eat half a quartern less.

(627) The unit of length is $\sqrt[3]{343}$ ft., or, 7 ft.;
∴ the unit of area is 49 sq. ft.;
∴ number required = $\frac{60 \times 100}{49}$ = $122\frac{22}{49}$.

(628) Cost price per lb. = $\frac{7}{8}$ of 4*s*. 8*d*. = 49*d*.;
selling at 60*d*., he makes 11*d*. profit on an outlay of 49*d*.;
∴ profit per cent. = $\frac{100 \times 11}{49}$ = $22\frac{22}{49}$.

(629) 7 half-crowns + 5 florins + 3 shillings = 30*s*. 6*d*.;
£12. 4*s*. + 30*s*. 6*d*. = 488 ÷ 61 = 8;
∴ the numbers are 56, 40, and 24.

(630) Area of walls = (80 × 6) sq. yd. + 2 (80 × 5) sq. yd.
= 1280 sq. yd.;
deduction for doors = (6 × 8 × 3) sq. ft. = 16 sq. yd.;
· number of pictures = $\frac{1264 \times 9}{8 \times 3}$ = 474.

		£	s.	d.	
(631)		5354	15	0	= cost at £1 per cent.
				4	
	4*s*. = $\frac{1}{5}$ of £1	21419	0	0	= ..... £4 ....
	8*d*. = $\frac{1}{6}$ of 4*s*.	1070	19	0	= ..... 4*s*. ....
		178	9	10	= ..... 8*d*. ....
		£22668	8	10	= cost at £4. 4*s*. 8*d*.

(632) The difference = 20 min. 19·9 sec. = 1219·9 sec.;
∴ fraction = $\frac{1219 \cdot 9}{31556929 \cdot 7}$ = ·000038.....

(633) Price of railway share = $\frac{2}{3}$ of £$93\frac{1}{2}$ = £$\frac{187}{3}$
= £62. 6*s*. 8*d*.

(634) 4593 lb. carried 49 miles cost £$20\frac{19}{40}$;
∴ 1 lb. carried 1 mile costs £$\frac{20\frac{19}{40}}{4593 \times 49}$;
∴ 1531 lb. carried 35 miles cost £$\frac{1531 \times 35 \times 819}{4593 \times 49 \times 40}$,
or, £4. 17*s*. 6*d*.

(635) 240*d*. − 10*d*. − $\frac{230}{25}$*d*. = $220\frac{4}{5}$*d*.;
∴ gross rental = $\frac{240}{220 \cdot 8}$ of £437 = £475.

(636) Value of the Russian money = (2·25 × 38)*d*.;
number of Swedish dollars = $\frac{2 \cdot 25 \times 38 \times 2}{27}$ = $6\frac{1}{3}$;
∴ there must be given 6 dol. 16 skil.

(637) 15 masons build 200 sq. yd. in 60 hours;
1 mason builds 1 sq. yd. in $\frac{60 \times 15}{200}$ hours;
7 masons build 420 sq. yd. in $\frac{420 \times 60 \times 15}{7 \times 200}$ hours;
∴ they take 270 hours, or, 30 days.

(638) The average dividend is 13*s*. 6*d*.;
∴ debts = $\frac{20}{13 \cdot 5}$ of £675 = £1000.

(639) Cost of 567 cwt. is £1130. 9*s*. $1\frac{1}{2}$*d.*;
cost of 1161 cwt. is £2469. 10*s*. $10\frac{1}{2}$*d.*;
∴ cost of 1728 cwt. is £3600.
He sells 1728 cwt. for $\frac{112}{100}$ of £3600, or, £(112 × 36):
∴ he sells 1 lb. for $\frac{112 \times 36 \times 20 \times 12}{1728 \times 112}$*d.*, or, 5*d.*

(640) P. W. of £100 = $\frac{100}{104\frac{1}{2}}$ of £100 = $\frac{200}{209}$ of £100;
∴ cash price : credit price = 200 : 209.
Next, cash price = $\frac{200}{209}$ of £114. 1*s*. 7*d*. = £109. 3*s*. 4*d*.

(641) First find the square root of 3 to 12 places of decimals, which is 1·732050807568; and then find the square root of 4·732050807568 to 6 places of decimals, which is 2·175327.

(642) Feet passed over in 1 second = $\frac{77 \times 1760 \times 3}{87 \times 60} = 77\frac{77}{87}$;
revolutions of wheel = $\frac{77 \times 1760 \times 3}{11\frac{1}{2}} = 35353\frac{1}{23}$.

(643) The wages of 1 man for 1 week are in the first case $\frac{£43.\ 4s.}{18 \times 4}$, or, 12*s*.;
the wages of 1 man for 1 week in the second case are $\frac{£67.\ 10s.}{16 \times 5}$, or, $16\frac{7}{8}$*s*.;
∴ price of wheat in second case = $\frac{16\frac{7}{8}}{12}$ of 64*s*. = 90*s*.

(644) Interest on £500 for 1 month = £$\frac{5}{3}$;
∴ by the end of the two years the second contractor would have received
£(4850 + 35 + 30 + 25 + 20 + 15 + 10 + 5),
or, £4990;
∴ the first is greater by £10.

(645) Sum to be invested = £$\frac{91\frac{1}{8} \times 105}{3}$ = £$\frac{25515}{8}$;
∴ legacy = $\frac{10}{9}$ of £$\frac{25515}{8}$ = £$\frac{28350}{8}$ = £3543. 15*s*.

(646) Cubic content of box $= (42 \times 19 \times 22)$ c. in.
$= 17556$ c. in.;
cubic content of 160 books $= (160 \times \frac{19}{2} \times \frac{21}{4} \times \frac{7}{4})$ c. in. $= 13965$ c. in.;
$\therefore$ space yet to be filled $= 3591$ c. in.;
$\therefore$ number of books $= \dfrac{3591}{7 \times 4\frac{1}{2} \times 1} = 114.$

(647) 4 boys and 2 men could do the work in 2 hours;
1 boy and 2 men could do the work in 3 hours;
$\therefore$ 3 boys do $\frac{1}{2} - \frac{1}{3}$, or, $\frac{1}{6}$ of the work every hour;
$\therefore$ a boy could do it in 18 hours;
hence 2 men do $\frac{1}{3} - \frac{1}{18}$, or, $\frac{5}{18}$ of the work in an hour;
$\therefore$ a man could do it in $\frac{36}{5}$ hr., or, $7\frac{1}{5}$ hours;
hence a boy and a man can do $\frac{1}{18} + \frac{5}{36}$, or, $\frac{7}{36}$ in an hour;
$\therefore$ a boy and a man can do it in $5\frac{1}{7}$ hours.

(648) 30029 rup. 4 ann. 6 pice $= 5765622$ pice;
interest $= \dfrac{5765622 \times 4\frac{1}{2}}{100}$ pice;
value $= \frac{57656 \cdot 22 \times 4 \cdot 5 \times 28 \cdot 5}{192}d. = £160.\ 9s.\ 4 \cdot 553203125d.$

(649) Money from sale of stock $= £\frac{1250 \times 96}{100} = £1200$;
income from railway stock $= £\dfrac{1200 \times 2\frac{1}{2}}{75} = £40$;
original income $= £\frac{1250 \times 3}{100} = £37.\ 10s.$;
$\therefore$ the increase is £2. 10*s.*

(650)

$$\begin{array}{r|l}
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\hline
22 & 53 \\
 & 44 \\
\hline
244 & 976 \\
 & 976 \\
\hline
248001 & \quad 248001 \\
 & \quad 248001 \\
\hline
\end{array}$$

$\sqrt{\frac{31 \cdot 36}{39 \cdot 69}} = \sqrt{\frac{4 \cdot 48}{5 \cdot 67}} = \sqrt{\frac{\cdot 64}{\cdot 81}} = \frac{\cdot 8}{\cdot 9} = \frac{8}{9}.$

(651) Value of 63 oz. = $\frac{63\times20}{8}$ of 26*d.* = 4095*d.* = £17. 1*s.* 3*d.*

(652) $350\cdot4 \times \cdot0105 = 3\cdot6792$;
$\frac{3\cdot6792}{\cdot0000219} = \frac{36792000}{219} = 168000.$

(653) 1 man on full rations consumes 1 qr. in $\frac{49\times7800}{910}$ days;
6440 men on full rations consume 690 qr. in
$\frac{49\times7800\times690}{6440\times910}$ days;
∴ on half rations in $\frac{49\times7800\times690}{3220\times910}$ days, or, 90 days.

(654) $\frac{2}{3} + \frac{1}{9} = \frac{7}{9}$; and ∴ $\frac{2}{9}$ of the army = 2000 men;
∴ the army originally consisted of 9000 men.

(655) The faster train gains $6\frac{2}{3}$ miles an hour on the slower train, which has 40 miles start, and overtakes it in $(40 \div 6\frac{2}{3})$ hours, or, 6 hours;
∴ it travels $(6 \times 16\frac{2}{3})$ miles, or, 100 miles.

(656) In 56 hours 1260 tons of water are raised by 15 pumps;
in 1 hour 1 ton of water is raised by $\frac{15\times56}{1260}$ pumps;
in 168 hours 7560 tons of water are raised by
$\frac{15\times56\times7560}{168\times1260}$ pumps;
∴ it will require 30 pumps.

(657) Interest = $£\frac{266\frac{2}{3}\times4\frac{1}{2}}{100\times4} = £3$;

P. W. = $\frac{100}{103\frac{3}{4}}$ of £83 = £80; and ∴ discount = £3.

(658) Since three-fifths are done in 24 days, two-fifths will take 16 days;
15 men can finish the work in (16×9) hours;
18 men can finish the work in $\frac{16\times9\times15}{18}$ hr.,
or, 120 hours;
∴ in 12 days they must work 10 hours a day.

(659) Cost of 1 hectolitre = (29 + ·01 + ·725 + ·29) fr.
= 30·025 fr.
cost of 1 bushel = $\frac{22}{64}$ of £$\frac{30\cdot025}{25\cdot3}$ = $\frac{66055}{8096}$*s.* = $8\frac{117}{736}$*s.*

(660) When *A* makes 15, *B* makes 12;
when *A* makes 15, *C* makes 8;
∴ *B* makes 12 when *C* makes 8;
∴ *B* makes 15 when *C* makes 10;
∴ *B* can give *C* 5 points.

(661) Divide 480 into 8 equal parts, each being 60; then one of the parts required is 180, and the other is 300.

(662) $\dfrac{\frac{32}{9} - \frac{165}{90}}{\frac{88}{9} - \frac{58}{9}} \times \frac{1}{71} \times \dfrac{\frac{213}{99}}{\frac{31}{10} \times \frac{100}{990}} = \frac{320-165}{880-580} \times \frac{1}{71} \times \frac{21300}{3100}$
$= \frac{155}{300} \times \frac{2}{31} = \frac{5}{100} = \frac{1}{20} = \cdot05.$

(663) 2 × breadth × breadth × $\dfrac{\text{breadth}}{2}$ = 4096 cub. ft.;
∴ cube of breadth = 4096 cub. ft.;
∴ breadth = 16 ft., length = 32 ft., height = 8 ft.

(664) 500 scudi = (52·5 × 50) fr.;
$= \frac{52\cdot5 \times 50 \times 16}{20}$*s.*;
$= \frac{52\cdot5 \times 50 \times 16 \times 12 \times 12}{20 \times 50}$ carl. = 6048 carl.

(665) Interest = interest on debt
discount = interest on present worth;
∴ interest − discount = interest on (debt − present worth)
= interest on the discount;
hence £$6\frac{1}{8}$ is the interest on £$21\frac{7}{8}$;
∴ the sum on which the interest is £28 is £$\dfrac{28 \times 21\frac{7}{8}}{6\frac{1}{8}}$,
or, £100.

(666) Cost of mixture per gallon = $\frac{10}{11}$ of 16*s*. 6*d*. = 15*s*.;
∴ two gallons of the mixture cost 30*s*.;
∴ he gave 14*s*. 6*d*. and 15*s*. 6*d*. per gallon.

(667) Rental = $\frac{3}{2}$ of £150 = £225;
∴ capital expended = £$\frac{225 \times 100}{4\frac{1}{2}}$ = £5000;
∴ he spent on repairs £(5000 − 4624), or, £376.

(668) 1 acre = (4840 × 9) sq. ft., and 5 qr. = 40 bushels;
∴ produce of 1 sq. ft. = $\frac{40}{4840 \times 9}$ bus. = $\frac{1}{121 \times 9}$ bus.;
∴ weight of produce = $\frac{60\frac{1}{2}}{121 \times 9}$ lb. = $\frac{1}{18}$ lb.

(669) 39 sheep and 33 pigs cost £147;
7 sheep and 33 pigs cost £67;
∴ 32 sheep cost £80, that is, a sheep costs £2. 10*s*.;
∴ 11 pigs cost £49 − £32. 10*s*., or, £16. 10*s*.;
that is, a pig costs £1. 10*s*.

(670) Content of wall = (60 × 20 × 4) cub. ft.;
space occupied by bricks = $\frac{93\frac{3}{4}}{100}$ of 4800 cub. ft.
= (375 × 12) c. ft.;
∴ number of bricks = $\frac{375 \times 12 \times 1728}{9 \times 4\frac{1}{2} \times 4}$ = 48000.

(671) (*a*) $\frac{20}{39}$ of 1521*d*. − $\frac{10}{33}$ of 1089*d*. = 780*d*. − 330*d*.
= £1. 17*s*. 6*d*.
(*β*) ·65 of 90*s*. + ·0125 of 1360*d*. = 58·5*s*. + 17*d*.
= £2. 19*s*. 11*d*.

	£	s.	d.	
(672)	4	2	4	= price of 1 lb.
			7	
4 oz. is $\frac{1}{3}$ of 1 lb.	28	16	4	= price of 7 lb.
1 oz. is $\frac{1}{4}$ of 4 oz.	1	7	$5\frac{1}{3}$	= ....4 oz.
10 dwt. is $\frac{1}{2}$ of 1 oz.		6	$10\frac{1}{3}$	= ....1 oz.
2 dwt. is $\frac{1}{5}$ of 10 dwt.		3	$5\frac{1}{6}$	= ....10 dwt.
12 gr. is $\frac{1}{4}$ of 2 dwt.			$8\frac{7}{30}$	= ....2 dwt.
			$2\frac{7}{120}$	= ....12 gr.
	£30	14	$11\frac{1}{8}$	= price of 7 lb. 5 oz. 12 dwt. 12 gr.

(673) When *A* gets £2, *B* gets £6 and *C* gets £15;
∴ *A*'s share = $\frac{2}{23}$ of £69 = £6;
B's share = $\frac{6}{23}$ of £69 = £18;
C's share = $\frac{15}{23}$ of £69 = £45.

(674) Weight of block = $\frac{20{\cdot}28 \times 2{\cdot}58 \times 2{\cdot}5 \times 7{\cdot}8 \times 1000}{16 \times 112 \times 20}$ tons,
= $\frac{507 \times 129 \times 39}{112 \times 8 \times 100}$ tons = $28\frac{41917}{89600}$ tons.

(675) $\frac{105}{300}$ of his property + $\frac{103}{600}$ of his property + $\frac{102}{200}$ of his property = £6190;
∴ $\frac{619}{600}$ of his property = £6190;
∴ his property was $\frac{600}{619}$ of £6190, or, £6000.

(676) P. W. = $\frac{100}{110}$ of £28 = £25. 9*s*. $1\frac{1}{11}$*d*.;
∴ difference = 5*s*. $1\frac{1}{11}$*d*.

(677) $\frac{2}{3} + \frac{5}{7}$ of $\frac{1}{3} + \frac{7}{8}$ of $\frac{2}{21} = \frac{2}{3} + \frac{5}{21} + \frac{1}{12} = \frac{83}{84}$;
∴ $\frac{1}{84}$ of the army = 500 men; and ∴ the army was 42000 men.

(678) 1 horse with 1 feed a day can be kept for 1 day for $\frac{£12.\ 8s.\ 0\frac{3}{4}d.}{9 \times 4 \times 21}$;
15 horses with 3 feeds a day can be kept for 36 days for $\frac{15 \times 3 \times 36}{9 \times 4 \times 21}$ of £12. 8*s*. $0\frac{3}{4}$*d*.;
∴ the cost is $\frac{15}{7}$ of £12. 8*s*. $0\frac{3}{4}$*d*., or, £26. 11*s*. $6\frac{3}{4}$*d*.

(679) For the proof of this see the first part of the answer to Question 665.

(680) 1 square mile = 640 acres;
∴ value = £$(83827 \times 640 \times \frac{91}{8})$ = £610260560

(681) 1 lb. of tea = $\frac{50 \times 84}{70}$ lemons = (5×12)*d.* = 5*s.*

(682) $100 \times 9 \times 924 = 100 \times 9 \times 11 \times 84$
$= 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 7 \times 11.$
To make this a perfect cube we must introduce the factor $2 \times 2 \times 5 \times 7 \times 7 \times 11 \times 11$, or, 118580.

(683) Amount invested = £$\dfrac{464 \times 91\frac{1}{2}}{3}$;
income in 4 per cents. = £$\dfrac{464 \times 91\frac{1}{2} \times 4}{3 \times 96}$
= £589. 13*s.* 4*d.*

(684) Cash price in notes = $\frac{19}{20}$ of 135 doll. = 128·25 doll.;
cash price in gold = $\frac{5}{6}$ of 128·25 doll. = 106·875 doll.;
payer should receive in gold (135 − 106·875) doll., or, 28·125 doll.;
∴ in notes $\frac{6}{5}$ of 28·125 doll., or, 33·75 doll.

(685) Selling price = $(45 \times 52 \times 3)$*s.*;
cost price = $\dfrac{100}{112\frac{1}{2}}$ of $(45 \times 52 \times 3)$*s.* = £312;
∴ price of 3rd butt = £312 − £230 = £82.

(686) A difference of 4*s.* per quarter makes a difference of 1*s.* 3¾*d.* in the expense of keeping the horse for a week;
∴ the horse in 1 week eats $\frac{63}{4 \times 12 \times 4}$ quarters;
∴ in a year it eats $\frac{63 \times 52}{4 \times 12 \times 4}$ qr., or, $17\frac{1}{16}$ qr.

(687) If the unit of measurement be 1 foot
breadth × $\frac{2}{3}$ of breadth × $\frac{3}{2}$ of breadth = 5832 c. ft.;
∴ cube of breadth = 5832 c. ft.;
∴ breadth = $\sqrt[3]{5832}$ ft. = 18 ft.;
∴ length is 27 ft., and height 12 ft.

(688) 100 scudi = $\frac{100 \times 45}{8}$ fr.;
= $\frac{100 \times 45 \times 4}{8 \times 5}$s.;
= $\frac{100 \times 45 \times 4 \times 72}{8 \times 5 \times 25}$ carl. = 1296 carl.

(689) As in Ex. 665, £1. 10s. $7\frac{1}{2}$d. is the interest on
£5. 9s. $4\frac{1}{2}$d.;
∴ sum required = $\frac{2625}{735}$ of £7 = £25.

(690) Suppose he buys 2 lb. of black tea and 1 lb. of green; he sells the mixture for 15s., and therefore it cost him $\frac{100}{125}$ of 15s., or, 12s.;
now put aside 2s. of this, as the extra price of the pound of green tea, and divide the remaining 10s. into three equal parts, then we find 3s. 4d. to be the price of the black tea, and 5s. 4d. that of the green.

(691)		7		365525875
				343
	21	1	14700	22525
			211	
			14911	14911
			1	
	213	5	1512300	7614875
			10675	
			1522975	7614875

(692) The L. C. M. of 6, 7, 8 is 168, and we must therefore divide £146000 in the proportion of 28, 24, and 21;
∴ first son gets $\frac{28}{73}$ of £146000, or, £56000,
and the other sons get £48000 and £42000 respectively.

(693) £3. 17*s*. 10$\frac{1}{2}$*d*. = 1869 halfpence;
L. C. M. of 1869 and 480 is $3 \times 623 \times 160$;
∴ 160 is the least number of ounces,
and 623 is the number of sovereigns.

(694) For every 3 days of the time he earned 4*s*. and paid 9*d*., and therefore received 3*s*. 3*d*.;
also, $39 \div 3\frac{1}{4} = 12$;
∴ 3×12, or, 36 was the number of days required.

(695) *A*, *B*, and *C* together do $\frac{1}{2}$ of $(\frac{1}{4} + \frac{1}{6} + \frac{1}{8})$ daily;
∴ they do $\frac{13}{48}$ daily; ∴ they take $3\frac{9}{13}$ days.

(696)
$$\begin{aligned} 1575 \text{ plethra} &= \frac{1575 \times 124}{5} \text{ toises} \\ &= \frac{1575 \times 124 \times 17}{5 \times 9} \text{ mètres} \\ &= \frac{1575 \times 124 \times 17 \times 39}{5 \times 9 \times 35} \text{ yd.} = 82212 \text{ yd.} \end{aligned}$$

(697) Interest on £93 for the first half year = £1·5;
interest on £94·5 for the second half year
$= £\frac{94 \cdot 5 \times 1 \cdot 5}{93} = £\frac{47 \cdot 25}{31}$;
∴ whole amount of interest $= £\frac{93 \cdot 75}{31}$;
∴ interest on £100 $= £\frac{100 \times 93 \cdot 75}{93 \times 31} = £\frac{3125}{961} = £3\frac{242}{961}$.

(698) *B* overtakes *A* in 3 hours, and *B* is then 12 miles from *P*. *C* is 10 miles from *P* when *B* turns back. *C* will have gone over five-ninths of the two miles when he meets *B*. Hence the place of meeting is $11\frac{1}{9}$ miles from *P*.

(699) After the first operation *Q* contains 1 gall. of water and 1 gall. of wine, and *R* contains 1 gall. of water and 3 gall. of wine;

after the second operation *Q* contains $\frac{1}{2}$ a gall. of water and $\frac{1}{2}$ a gall. of wine and $\frac{1}{4}$ gall. of water and $\frac{3}{4}$ gall. of wine, and *R* contains $\frac{3}{4}$ gall. of water and $\frac{9}{4}$ gall. of wine and $\frac{1}{2}$ a gall. of water and $\frac{1}{2}$ a gall. of wine;

∴ *Q* contains $\frac{5}{4}$ gall. of wine and *R* contains $\frac{5}{4}$ gall. of water.

(700) Weight $= \frac{4840 \times 9 \times 144 \times 1000}{1728 \times 16 \times 112 \times 20}$ tons $= 101\frac{127}{448}$ tons.

(701) $\frac{1}{4} \times \frac{1}{14} \times \frac{7}{7}$ of 168*s.* $= \frac{42}{14}$*s.* = 3*s.*

(702) $\frac{1}{8} + \frac{1}{3} + \frac{1}{20} = \frac{15+40+6}{120} = \frac{61}{120}$;

∴ he has left $\frac{59}{120}$ of £500, or, £245. 16*s.* 8*d.*

(703) Money from sale of Russian stock = £(104 × 19) = £1976;

income from Consols $= \frac{2}{95}$ of £$962\frac{2}{3}$ = £$\frac{152}{5}$ = £$30\frac{2}{5}$;

his original income was £76, and thus he has to get £$45\frac{3}{5}$ income from £$1013\frac{1}{3}$;

∴ rate of interest = £$\frac{45\frac{3}{5} \times 100}{1013\frac{1}{3}}$ = £$\frac{228 \times 100 \times 3}{5 \times 3040}$ = £$4\frac{1}{2}$.

(704) 210 = 2 × 105 = 2 × 3 × 35 = 2 × 3 × 5 × 7;

294 = 2 × 147 = 2 × 3 × 49 = 2 × 3 × 7 × 7;

336 = 2 × 2 × 84 = 2 × 2 × 2 × 2 × 3 × 7;

∴ numbers that will divide each are 2, 3, 6, 7, 14, 21, 42;

and L. C. M. is 2 × 3 × 5 × 7 × 7 × 2 × 2 × 2, or, 11760.

(705) 1 lb. troy = $\frac{144}{175}$ lb. avoirdupois (see p. 140);
weight of rings = $\frac{1050 \times 28}{12 \times 20 \times 24}$ lb. troy;
= $\frac{144 \times 1050 \times 28}{175 \times 12 \times 20 \times 24}$ lb. avoirdupois
= $\frac{21}{5}$ lb. avoirdupois;
weight of rings and box = $(\frac{21}{5} + 3\frac{1}{2})$ lb. avoirdupois
= $7\frac{7}{10}$ lb. avoirdupois;
cost of carriage = $\frac{144 \times 5 \times 77}{2240 \times 10}$*s.* = 2*s.* 5·7*d.*;
cost of insurance = 11·55 half-crowns = £1. 8*s.* 10·5*d.*;
∴ whole cost = £1. 11*s.* 4·2*d.*

(706) Interest for 1st year = £250;
interest for 2nd year = £275;
interest for 3rd year = £302·5;
interest for 4th year = £332·75;
interest for 5th year = £366·025;
the sum of these is £1526. 5*s.* 6*d.*; so that the interest to be gained after the 5th year is £201. 6*s.* 3·3*d.*;
now interest for 6th year = £402·6275
= £402. 12*s.* 6·6*d.*;
∴ $5\frac{1}{2}$ years is the time required.

(707) $10 \times 1\frac{1}{2} \times 3 + 30 \times 2 \times 2 + 100 \times 3\frac{1}{4} \times 1 = 490$;
$20 \times 1 \times 3 + 40 \times 1\frac{1}{2} \times 2 + 200 \times 4 \times 1 = 980$;
∴ *B* has to pay twice as much as *A*;
∴ *A* pays £20 and *B* pays £40.

(708) The first clock strikes 7 when the second strikes 5, and therefore the time is 7 o'clock.

(709) It is clear that, since there is half a day difference in the time of completion according as the boy or the man commences the work, the man does just twice as much in a day as the boy does.
hence together they do $(\frac{1}{13} + \frac{2}{13})$ daily, or, $\frac{3}{13}$ daily;
∴ they will finish the work in $4\frac{1}{3}$ days.

(710) £$124\frac{1}{2}$ invested in the first company produces £5 interest;

£$124\frac{1}{2}$ invested in the second company buys $\frac{124\frac{1}{2}}{8\frac{1}{2}}$ shares;

these shares produce £$\frac{124\frac{1}{2}\times 4\frac{5}{6}\times 7\frac{1}{2}}{8\frac{1}{2}\times 100}$ interest, or, £$\frac{7221}{1360}$;

∴ the rates are as 5 : $\frac{7221}{1360}$, or, 6800 : 7221.

(711)

	£	s.	d.	
	7	7	$4\frac{1}{2}$	= cost of 1 ton
			11	
10 cwt. is $\frac{1}{2}$ of 1 ton	81	1	$1\frac{1}{2}$	= cost of 11 tons
5 cwt. is $\frac{1}{2}$ of 10 cwt.	3	13	$8\frac{1}{4}$	= ...... 10 cwt.
2 cwt. is $\frac{1}{5}$ of 10 cwt.	1	16	$10\frac{1}{8}$	= ...... 5 cwt.
1 qr. is $\frac{1}{8}$ of 2 cwt.		14	$8\frac{17}{20}$	= ...... 2 cwt.
		1	$10\frac{17}{160}$	= ...... 1 qr.
	£87	8	$2\frac{133}{160}$	= cost of 11 tons 17 cwt. 1 qr.

(712) 13 ac. 81 yd. = 63001 sq. yd.;

∴ side of field = $\sqrt{63001}$ yd. = 251 yd.;

∴ time required = $\frac{251\times 4\times 60}{3\frac{1}{2}\times 1760}$ min. = $9\frac{60}{77}$ min.

(713) For an income of $2\frac{1}{2}$ in the 3 per cents. I shall have to pay £$\frac{2\frac{1}{2}\times 94}{3}$, or, £$78\frac{1}{3}$, and therefore the 3 per cents. is the better investment.

(714) P. W. = $(\frac{100}{105})^4$ of £881. 4*s.* $10\frac{7}{80}$*d.* (by Art. 178)

$= (\frac{20}{21})^4$ of $\frac{16919847}{80}$*d.*

$= \frac{20\times 20\times 20\times 20\times 16919847}{194481\times 80}$*d.* = $(20\times 20\times 5\times 87)$*d.*

= £725.

(715) 35 men can complete the work in 38 days;
1 man can complete the work in (38 × 35) days;
19 men can complete the work in $\frac{38 \times 35}{19}$ days, or 70 days.

(716) They could have let the machine for £120;
of this one should have taken £90 and the other £30;
∴ the latter should pay the former £30.

(717) Here we have to find the L. C. M. of 32, 36, and 40, which is 1440;
hence they stop together at intervals of 1440 inches;
∴ number of times = $\frac{1760 \times 36}{1440} = 44$.

(718) Since *B* gets £2750 at the end of two years, he receives $\frac{100}{110}$ of £2750, or, £2500;
A calculates £2500 to be the P. W. of £2725, that is, that the interest on £2500 for 2 years is £225;
∴ rate per cent. = £$\frac{225}{25 \times 2}$, or, £$4\frac{1}{2}$.

(719) With length of stroke 3 ft. it takes 75 hours for 5 pumps;
with length of stroke 1 ft. it takes 1 hour for (3×5×75) pumps;
with length of stroke $2\frac{1}{2}$ ft. it takes 120 hours for $\frac{3 \times 5 \times 75}{2\frac{1}{2} \times 120}$ pumps;
and since the strokes are 4 times as quick in the former case, we shall require $\frac{4 \times 3 \times 5 \times 75}{2\frac{1}{2} \times 120}$ pumps, or, 15 pumps.

(720) His original income was £$\frac{3\frac{1}{2} \times 18550}{92\frac{3}{4}}$, or, £700;
income from 4 per cents. = £$\frac{3710 \times 4}{96}$ = £$154\frac{7}{12}$;
income from 3 per cents. = £$\frac{14840 \times 3}{90}$ = £$494\frac{2}{3}$;
∴ total of new income = £$649\frac{1}{4}$;
∴ decrease = £700 − £$649\frac{1}{4}$ = £50. 15*s*.

(721) $\frac{2}{3}$ of 4*s*. 6*d*. = 3*s*.; 2·35 of 30*d*. = 5*s*. 10$\frac{1}{2}$*d*.;
·2375 of £2 = 9*s*. 6*d*.; and the sum is 18*s*. 4$\frac{1}{2}$*d*.;
also, fraction $= \frac{441}{126 \times 2} = \frac{49}{14 \times 2} = \frac{7}{4} = 1·75$.

(722) 36 men dig (72 × 18 × 12) c. yd. in (8 × 16) hours;
1 man digs 1 c. yd. in $\frac{8 \times 16 \times 36}{72 \times 18 \times 12}$ hours;
32 men dig (64 × 27 × 18) c. yd. in $\frac{64 \times 27 \times 18 \times 8 \times 16 \times 36}{32 \times 72 \times 18 \times 12}$ hours;
∴ they take 288 hours, or, 24 days.

(723) Amount of rent = (240 × 24)*s*. = £288;
∴ total outlay $= £\frac{288 \times 100}{3\frac{3}{4}} = £7680$;
∴ outlay on repairs = £7680 − £6500 = £1180.

(724) Income in 3 per cents. $= £\frac{3 \times 52\frac{1}{2}}{95\frac{7}{8}} = £1\frac{493}{767}$ on each £100 of the railway stock, which originally produced an income of £1$\frac{5}{8}$;
now $\frac{493}{767}$ is greater than $\frac{5}{8}$, and ∴ he increases his income.

(725) 10 men and 6 boys can reap 23 ac. in 2 days;
9 men and 6 boys can reap 21 ac. in 2 days;
∴ 1 man can reap 2 ac. in 2 days;
∴ 1 man can reap 1 ac. in 1 day;
hence 3 boys can reap 3 ac. in 4 days;
∴ 1 boy can reap $\frac{1}{4}$ ac. in 1 day;
∴ the number of boys required is 2.

(726) In 1 minute the pipe discharges $\frac{312·5 \times 16}{1000}$ c. ft. of water;
∴ length of the stream $= \frac{312·5 \times 16 \times 1728}{1000 \times 5}$ inches;
∴ rate per hour $= \frac{312·5 \times 16 \times 1728 \times 60}{1000 \times 5 \times 36 \times 1760}$ miles $= 1\frac{7}{11}$ miles.

(727) 15 turkeys and 9 fowls cost £12. 15*s.*;
2 turkeys and 9 fowls cost £3;
∴ 13 turkeys cost £9. 15*s.*, and ∴ 1 turkey costs 15*s.*;
∴ 9 fowls cost £1. 10*s.*, and ∴ 1 fowl costs 3*s.* 4*d.*

(728) $\frac{1}{20} + \frac{1}{7}$ of $\frac{19}{20} = \frac{1}{20} + \frac{19}{140} = \frac{13}{70}$;
∴ $\frac{57}{70}$ of his gross income is liable to income-tax;
then $\frac{5}{240}$ of $\frac{57}{70}$ of his income = 19 guineas;
∴ his income = $\frac{240 \times 70 \times 19}{5 \times 57}$ guineas = 1120 guineas
= £1176.

(729) P. W. of the bill = $\frac{100}{120}$ of £180 = £150;
the wine and picture are charged at £21 + £19, or, £40;
∴ he pays in cash £150 − £40, or, £110;
next, the cash price of the bill is to the usurer £110 + £10, or, £120;
∴ he gets £60 interest on £120 for 4 months, which is 50 per cent. for 4 months, and 150 per cent. for a year.

(730)				
		3		28·000000000000
				27
	9	0	2700	1000
	90	3	270000	1000000
			2709	
			272709	818127
			9	
	909	6	27542700	181873000
			54576	
			27597276	165583656
			36	
	9108	5	2765188800	16289344000
			455425	
				13828221225
			2765644225	

∴ cube root is 3·0365...

(731)

$$\begin{array}{rl} 32856 & \\ 121711 & \\ \hline 361416 & \text{the result of multiplying the first line by 11} \\ 229992 & \text{the result of multiplying the first line by 700} \\ 3975576 & \text{the result of multiplying the third line by 11000} \\ \hline 3998936616 & \end{array}$$

(732) $\dfrac{\frac{28}{10} \times \frac{225}{99}}{\frac{1125}{990}} + \dfrac{\frac{40}{9} - \frac{255}{90}}{\frac{15}{9} + \frac{2627}{999}} \times \frac{2040}{225}$

$= \frac{28 \times 225}{1125} + \frac{145 \times 204 \times 111}{4292 \times 225} = \frac{28}{5} + \frac{29 \times 51 \times 111}{1073 \times 45}$

$= \frac{28}{5} + \frac{153}{45} = 9.$

(733) For 31 days, at $7\frac{1}{2}$*d.* the loaf, it cost 558*s.*;

for 1 day, at 1*d.* the loaf, it would cost $\dfrac{558}{31 \times 7\frac{1}{2}}$*s.*;

for 20 days, at $6\frac{1}{4}$*d.* the loaf, it would cost $\dfrac{558 \times 20 \times 6\frac{1}{4}}{31 \times 7\frac{1}{2}}$*s.*;

∴ for $\frac{2}{3}$ the number of persons it would cost $\frac{2 \times 558 \times 20 \times 25}{3 \times 31 \times 15 \times 2}$*s.*, or, £10.

(734) Rate per cent. $= \frac{100 \times 2 \times 52}{240} = \frac{520}{12} = 43\frac{1}{3}$.

(735) Write C. P. for the cost price in shillings;

then $\frac{21}{20}$ of C. P. $- 1 = \frac{11}{10}$ of $\frac{19}{20}$ of C. P.;

∴ $(\frac{21}{20} - \frac{209}{200})$ of C. P. $= 1$, or, $\frac{1}{200}$ of C. P. $= 1$;

∴ C. P. = 200, or, cost price = £10.

(736) His original income was £150, and his new income, £155;

∴ sum invested in $3\frac{1}{2}$ per cent. stock $= £\dfrac{155 \times 87\frac{1}{2}}{3\frac{1}{2}}$

= £3875;

∴ price of 3 per cents. $= £\frac{3875 \times 100}{5000} = £77\frac{1}{2}$.

(737) $(\frac{21}{20})^2$ of sum − $\frac{11}{10}$ of sum = £5. 18*s*. $9\frac{3}{4}$*d.*;
$\therefore$ $(\frac{441}{400} - \frac{11}{10})$ of sum = £5. 18*s*. $9\frac{3}{4}$*d.*;
$\therefore$ $\frac{1}{400}$ of sum = £5. 18*s*. $9\frac{3}{4}$*d.*;
$\therefore$ sum = £2376. 5*s*.

(738) Cubic yards in obelisk = $\frac{2}{3}$ of $\frac{113 \times 108}{27} = 301\frac{1}{3}$;
weight of a foot of granite = $\dfrac{600 \times 20 \times 112}{301\frac{1}{3} \times 27}$ lb.
= $165\frac{65}{339}$ lb.

(739) *A* runs 100 yards while *B* runs 96 yards;
A runs 100 yards while *C* runs 95 yards;
$\therefore$ *B* runs 96 yards while *C* runs 95 yards;
hence *B*, giving *C* 1 yard start, will overtake him at the end of 96 yards, and will therefore beat him in a hundred yards race.

(740) $\frac{1}{2}$ of content − 9 gallons = $\frac{1}{5}$ of content;
$\therefore$ $(\frac{1}{2} - \frac{1}{5})$ of content = 9 gall., or, $\frac{3}{10}$ of content = 9 gall.;
$\therefore$ content of vessel = 30 gallons.

(741) 100 links = 1 chain, and 10 square chains = 1 acre (p. 134);
$\therefore$ area = $\frac{12 \cdot 25 \times 5 \cdot 6}{10}$ ac. = 6·86 ac. = 6 ac. 3 ro. $17\frac{3}{5}$ po.

(742) £5·7 − £4·125 = £1·575 = £1. 11*s*. 6*d.* = $\frac{3}{2}$ of a guinea.

(743) 21 qr. for 15 miles will cost 98*d.*;
1 qr. for $7\frac{1}{2}$ miles will cost $\frac{98}{21 \times 2}$*d.*;
71 qr. for $7\frac{1}{2}$ miles will cost $\frac{98 \times 71}{21 \times 2}$*d.* = 13*s*. $9\frac{2}{3}$*d.*

(744) *A*, *B*, *B* and *C* do $(\frac{1}{2} + \frac{3}{5})$ in an hour;
A, *A*, *B*, *B*, *C*, *C* do $\frac{3}{2}$ in an hour;
$\therefore$ *A* and *C* do $(\frac{3}{2} - \frac{11}{10})$ in an hour;
$\therefore$ they take $\frac{10}{4}$ hr., or, $2\frac{1}{2}$ hr.

(745) Cost price = $\frac{100}{107}$ of £69. 11*s*. = £65;
∴ loss is £65 − £61. 15*s*., or, £3. 5*s*.;
∴ loss per cent = $\frac{3{\cdot}25 \times 100}{65} = \frac{325}{65} = 5$.

(746) One man walks $\frac{3}{6}$ miles and the other $\frac{4}{6}$ miles;
∴ length of walk = $(\frac{3}{6} + \frac{4}{6})$ miles = $1\frac{1}{6}$ miles.

(747) Amount of stock in 3 per cents. = £$\frac{5187{\cdot}5 \times 100}{83}$;
money from sale of this stock = £$\frac{5187{\cdot}5 \times 85}{83}$
= £5312·5;
income from 4 per cents. = $\frac{3}{5}$ of £$\frac{5312{\cdot}5 \times 4}{96}$
= £132·8125;
income from $\frac{3}{5}$ of 3 per cents. = $\frac{3}{5}$ of £$\frac{5187{\cdot}5 \times 3}{83}$
= £112·5;
∴ difference = £20·3125 = £20. 6*s*. 3*d*.

(748) Interest on the true discount = 5*s*. $1\frac{1}{4}$*d*. for 3 months;
interest on £100 = £1 for 3 months;
∴ true discount = 100 times $64\frac{1}{4}$*d*.;
again, £1 is the true discount on £101;
∴ amount of bill = 101 × 100 × $64\frac{1}{4}$*d*. = £2577. 12*s*. 1*d*.

(749) Difference in retail price per cwt. = 448*d*.;
put C. P. for the cost price of a cwt. of the first in pence;
then $\frac{112}{100}$ of (C. P. + 240) − $\frac{105}{100}$ of C. P. = 448;
∴ $\frac{7}{100}$ of C. P. + $\frac{26880}{100}$ = 448;
∴ 7 times C. P. = 44800 − 26880 = 17920;
∴ C. P. = 2560;
hence £10. 13*s*. 4*d*. and £11. 13*s*. 4*d*. are the cost prices.

(750) $\frac{1}{10} + \frac{1}{20} + \frac{1}{30} + \frac{1}{40} + \frac{1}{50} + \frac{1}{60} = \frac{147}{600} = \frac{49}{200}$;
∴ $\frac{151}{200}$ of the rod = 302 in.; ∴ the rod is 400 in.

(751) £10. 1*s*. 3*d*. = 9660*q*.; and £12. 11*s*. $6\frac{3}{4}$*d*. = 12075*q*.;
∴ income-tax = $\frac{6 \times 12075}{9660}$*d*. = $7\frac{1}{2}$*d*.

(752) 20 men can reap 105 ac. in 72 hours;
1 man can reap 1 ac. in $\frac{72 \times 20}{105}$ hours;
16 men can reap 126 ac. in $\frac{72 \times 20 \times 126}{16 \times 105}$ hours;
∴ they take 108 hours, or, $6\frac{3}{4}$ days.

(753) $\frac{100}{120}$ of £245, or, £$\frac{5 \times 245}{6}$, is the cost of $187\frac{1}{2}$ cwt.;
∴ cost of 1 cwt. = £$\frac{5 \times 245 \times 2}{6 \times 375}$ = £1. 1*s.* $9\frac{1}{3}$*d.*

(754) Interest for 1st year = £750;
interest for 2nd year = £795;
interest for 3rd year = £842·7;
∴ amount at end of 3rd year = £14887. 14*s.*;
now £15185. 9*s.* 0·96*d.* − £14887. 14*s.*
= £297. 15*s.* 0·96*d.*;
and interest on £14887. 14*s.* for $\frac{1}{3}$ year
= £297. 15*s.* 0·96*d.*;
∴ $3\frac{1}{3}$ years is the time required.

(755) $\frac{3}{90}$ of sum in 3 per cents. + $\frac{13}{388}$ of sum in $3\frac{1}{4}$ per cents. = £500;
∴ $\frac{1}{30}$ of sum in 3 per cents. + $\frac{13}{388}$ of £14970 − $\frac{13}{388}$ of sum in 3 per cents. = £500;
∴ £$(\frac{13 \times 14970}{388} - 500) = \frac{1}{15 \times 388}$ of sum in 3 per cents.;
∴ sum in 3 per cents. = £$(13 \times 14970 \times 15 - 500 \times 15 \times 388)$
= £(15×610) = £9150;
∴ he invests £9150 in 3 per cents. and £5820 in $3\frac{1}{4}$ per cents.

(756) Cost of the 30 lb. = 20*s.* 3*d.* + 3*s.* 9*d.* = 24*s.*;
selling price = $\frac{125}{100}$ of 24*s.* = 30*s.*;
∴ he sells the mixture at 1*s.* per lb.

(757) Rent amounts to $\{ (\frac{104}{100})^2 + \frac{104}{100} + 1 \}$ of £30

$= £\frac{312216 \times 30}{10000}$;

∴ I receive in all £1030 + £93·648 = £1123·648;

£1000 in 3 years would amount to $(\frac{104}{100})^3$ of £1000, or, £1124·864;

∴ I lose £1·216, or, £1. 4*s*. 3·84*d*.

(758) 15*s*. is the interest of £20 (see Question 665);

∴ the sum $= £\frac{20 \cdot 75 \times 20}{\cdot 75}$ = £553. 6*s*. 8*d*.;

and the rate, since £1 is the interest on £20 for a year, is 5 per cent.

(759) $3\frac{1}{2}$ per cent. on £5000 = £175;

∴ $\frac{233}{240}$ of gross income = £747. 5*s*. 10*d*. + £175

= £922. 5*s*. 10*d*.;

∴ gross income = $\frac{240}{233}$ of £922. 5*s*. 10*d*. = £950;

and income-tax = (950 × 7)*d*. = £27. 14*s*. 2*d*.

(760)

$$
\begin{array}{r|l}
11 & 7\cdot00 \\
\hline
2 & \cdot\dot{6}\dot{3} \\
\hline
 & \cdot31818181\dot{8} \\
 & \cdot00003977\dot{2} \\
\hline
 & \cdot31822159\dot{0}
\end{array}
$$

$$
\begin{array}{l}
3\cdot14159\,)\,1\cdot000000000\,(\,\cdot31831\ldots\ldots \\
\quad 942477 \\
\quad \overline{575230} \\
\quad 314159 \\
\quad \overline{2610710} \\
\quad 2513272 \\
\quad \overline{\ \ 974380} \\
\quad \ \ 942477 \\
\quad \overline{\ \ 319030} \\
\quad \ \ 314159 \\
\quad \overline{\qquad\quad}
\end{array}
$$

∴ the difference lies between ·0001 and ·0002.

(761) $\frac{5 \times 3 \times 11 \times 2 \times 13 \times 27}{9 \times 8 \times 15 \times 7 \times 18 \times 39} = \frac{11}{4 \times 7 \times 18} = \frac{11}{504}$;

$\cdot014 - \frac{3}{250} = \frac{14}{1000} - \frac{12}{1000} = \frac{1}{500}$;

$\frac{11}{504} + \frac{1}{500} = \frac{6004}{252000} = \frac{6 \cdot 004}{252} = \cdot023\dot{8}2539\dot{6}$.

(762) Cubic content of the plate = $\frac{9}{8}$ of a cub. inch;
thickness of new surface = $\{ \frac{9}{8} \div (7 \times 7 \times 9 \times 144) \}$ inches;
= $\frac{1}{8 \times 7 \times 7 \times 144}$ in. = $\frac{1}{56448}$ in.

(763) *C*'s share = $\frac{6}{7}$ of *D*'s share;
B's share = $\frac{4}{5}$ of $\frac{6}{7}$ of *D*'s share = $\frac{24}{35}$ of *D*'s share;
A's share = $\frac{2}{3}$ of $\frac{24}{35}$ of *D*'s share = $\frac{16}{35}$ of *D*'s share;
∴ $(1 + \frac{6}{7} + \frac{24}{35} + \frac{16}{35})$ of *D*'s share = £21000;
∴ $\frac{105}{35}$ of *D*'s share = £21000;
∴ *D*'s share = £7000;
∴ *C* gets £6000, *B* gets £4800, *A* gets £3200.

(764) £2. 12*s*. is the interest on £30;
∴ sum = £$\frac{33 \cdot 6 \times 30}{3 \cdot 6}$ = £280;
and rate per cent. per annum = $\frac{11 \cdot 2 \times 100}{280} = 4$.

(765) Fare for 1 kilomètre = $\frac{23 \cdot 05}{374}$ fr.
= $\frac{23 \cdot 05 \times 12 \times 20}{374 \times 25 \cdot 225}d.$;
fare for 1 yard = $\frac{23 \cdot 05 \times 12 \times 20}{374 \times 25 \cdot 225 \times 1093\frac{1}{3}}d.$;
fare for 1 mile = $\frac{23 \cdot 05 \times 12 \times 20 \times 1760 \times 3}{374 \times 25 \cdot 225 \times 3280}d.$
= $\frac{461 \times 12 \times 4 \times 3 \times 10}{17 \times 1009 \times 41}d. = \frac{663840}{703273}d.$;
∴ the rates are as 663840 : 703273.

(766) *C* runs 1760 yd. while *D* runs 1700 yd.;
C runs 1760 yd. while *B* runs $\frac{1760 \times 1700}{1720}$ yd.;
C runs 1760 yd. while *A* runs $\frac{1760 \times 1760 \times 1700}{1720 \times 1740}$ yd.,
or, $\frac{1760 \times 3740}{3741}$ yd.;
∴ *C* wins by $1760\,(1 - \frac{3740}{3741})$ yd., or, $\frac{1760}{3741}$ yd.

(767) Interest = £1709. 7*s*. $7\frac{1}{3}d.$ − £732. 11*s*. 10*d*.
= £976. 15*s*. $9\frac{1}{3}d.$;
interest for 1 year = $\frac{5\frac{1}{3}}{100}$ of £732. 11*s*. 10*d*.
= £39. 1*s*. $5 \cdot 17\dot{3}d.$;
∴ number of years = $\frac{234429 \cdot \dot{3}}{9377 \cdot 17\dot{3}} = 25$.

(768) $1350 = 2 \times 3 \times 5 \times 45 = 2 \times 3 \times 3 \times 3 \times 5 \times 5$;
$\therefore$ the factor required is 2×3, or, 6.

(769) $5 \times 50 + 6 \times 40 + 7 \times 35 = 250 + 240 + 245 = 735$;
$\therefore$ *A*'s tax is $\frac{50}{147}$ of £5. 2*s*. 1*d*. = $(50 \times 8\frac{1}{3})$*d*.
= £1. 14*s*. $8\frac{2}{3}$*d*.;
B's tax is $\frac{48}{147}$ of £5. 2*s*. 1*d*. = $(48 \times 8\frac{1}{3})$*d*.
=£1. 13*s*. 4*d*.;
C's tax is $\frac{49}{147}$ of £5. 2*s*. 1*d*. = $(49 \times 8\frac{1}{3})$*d*.
= £1. 14*s*. $0\frac{1}{3}$*d*.

(770) Cost price = $\frac{8}{9}$ of $5\frac{1}{3}$*s*. = $\frac{128}{27}$*s*.;
$(6 - \frac{128}{27})$*s*. = $\frac{34}{27}$*s*.;
$\therefore$ gain per cent. = $\frac{34 \times 100}{128} = \frac{425}{16} = 26\frac{9}{16}$.

(771) $\frac{3+4}{4+5} = \frac{7}{9}$; and $\frac{7}{9}$ is greater than $\frac{3}{4}$, because $\frac{28}{36}$ is greater than $\frac{27}{36}$;
also $\frac{7}{9}$ is less than $\frac{4}{5}$, because $\frac{35}{45}$ is less than $\frac{36}{45}$.

(772) 32 boys are equivalent to 20 men;
15 men can finish the work in 48 days;
20 men can finish the work in $\frac{48 \times 15}{20}$ days, or, 36 days.

(773) On each £100 borrowed he gets for interest
£$(\frac{5}{2} + \frac{5}{2} + \frac{5}{80})$;
$\therefore$ he gains £$(5\frac{5}{80} - 3\frac{1}{2})$, or, £$\frac{125}{80}$;
$\therefore$ he borrows £$\frac{200 \times 100}{\frac{125}{80}}$, or, £12800.

(774) Originally there are 56 lb. of saltpetre and 24 lb. sulphur. We have now to find what number bears the same ratio to 24 that 11 does to 4, and this number is $\frac{24 \times 11}{4}$, or 66. Hence we must add 10 lb. of saltpetre.

(775) Allowance for carriage = $\frac{2\frac{1}{2}}{100}$ of 448*s.* = 11·2*s.*;

∴ the customer has to pay 4·8*s.*, or, 4*s.* 9$\frac{3}{5}$*d.*

(776) The debts amount to £1215. 19*s.* 2*d.*, or, 583660 halfpence;

the assets amount to £911. 19*s.* 4$\frac{1}{2}$*d.*, 01, 437745 halfpence;

∴ he pays in the pound $\frac{437745}{583660}$ × 20*s.*, or, $\frac{3}{4}$ × 20*s.*, or, 15*s.*

(777) 1*s.* 0$\frac{1}{2}$*d.* = $\frac{25}{480}$ of £1, and $\frac{455}{480}$ of £1 remain after the deduction;

$\frac{95}{100}$ of $\frac{455}{480}$ = $\frac{19\times 91}{20\times 96}$ = $\frac{1729}{1920}$;

∴ $\frac{1729}{1920}$ of the gross income = £864$\frac{1}{2}$ = £$\frac{1729}{2}$;

∴ gross income = £$\frac{1920}{2}$ = £960.

(778) Cost price = $\frac{100}{105\frac{1}{2}}$ of £2. 17*s.* 9*d.* = $\frac{138600}{211}$*d.*;

cost of a cwt. at 7$\frac{1}{2}$*d.* per lb. = 840*d.*;

∴ gain = 840*d.* − $\frac{138600}{211}$*d.* = $\frac{38640}{211}$*d.*;

∴ gain per cent. = $\frac{100\times 38640}{138600}$ = $\frac{920}{33}$ = 27$\frac{29}{33}$.

(779) At the reduced speed it takes 70 min. to pass over $\frac{1}{5}$ of 147 miles;

∴ in 1 hour at the reduced speed the train goes $\frac{147\times 6}{5\times 7}$ miles;

∴ in 1 hour at original speed it goes $\frac{5}{4}$ of $\frac{147\times 6}{5\times 7}$ miles, or, 31$\frac{1}{2}$ miles.

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780)          ·00090421031260 81 ( ·03007009
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         6007 |   42103
              |   42049
              |--------------
      6014009 |      54126081
              |      54126081
              |--------------
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(781) Interest $= £\frac{10921\frac{7}{8} \times 3\frac{2}{3} \times 4\frac{1}{2}}{100} = £1802 \cdot 109375$;

P. W. $= \frac{100}{116\frac{1}{2}}$ of $£10921\frac{7}{8} = £9375$;

discount $= £10921\frac{7}{8} - £9375 = £1546 \cdot 875$;

∴ difference $= £255 \cdot 234375 = £255.\ 4s.\ 8\frac{1}{4}d.$

(782) Area of piece $= (1045\frac{1}{3} \times 568\frac{8}{13})$ sq. in.;

∴ cost of an acre $= £\frac{4840 \times 9 \times 144 \times 234\frac{1}{2}}{1045\frac{1}{3} \times 568\frac{8}{13}}$

$= £\frac{4840 \times 9 \times 144 \times 469 \times 3 \times 13}{3316 \times 7392 \times 2}$

$= \frac{55 \times 9 \times 9 \times 67 \times 13}{1568} = £2474\frac{1073}{1568}.$

(783) Selling price to gain 4 per cent. $= \frac{104}{100}$ of $£150$

$= £156$;

he sells $\frac{1}{3}$ of the goods for $\frac{96}{100}$ of $£50$, or, $£48$;

he has to sell the rest for £108, which is £12 more than £96, at which price he would have sold the rest at the first rate;

∴ rate of increase per cent. $= \frac{12 \times 100}{96} = 12\frac{1}{2}$.

(784) The scores in each successive innings after the first are $\frac{3}{4}$, $\frac{9}{16}$ and $\frac{27}{64}$ of the first score;

∴ $(1 + \frac{9}{16})$ of first score $= (\frac{3}{4} + \frac{27}{64})$ of first score $+ 50$;

∴ $\frac{25}{16}$ of first score $= \frac{75}{64}$ of first score $+ 50$;

∴ $\frac{25}{64}$ of first score $= 50$;

∴ the scores are 128, 96, 72, 54.

(785) Cost price of 1 lb. of first $= \frac{20}{19}$ of $30d. = \frac{600}{19}d.$;

cost price of 1 lb. of second $= \frac{50}{57}$ of $40d. = \frac{20}{5}\ \ d.$;

∴ cost price of 2 lb. mixed $= \frac{3800}{57}d. = \frac{200}{3}d.$;

∴ gain $= (72 - \frac{200}{3})d. = \frac{16}{3}d.$;

∴ gain per cent. $= \frac{16 \times 100}{200} = 8.$

(786) Distance A walks after meeting $B = (2 \times 3\frac{3}{4})$ miles $= 7\frac{1}{2}$ miles; and this is the distance that B has to walk before he reaches X;

$\therefore$ time required $= (7\frac{1}{2} + 3)$ hours $= 2\frac{1}{2}$ hours.

(787) $\frac{15}{400}$ of price per quarter $= 21d.$;

$\therefore$ price $= \frac{21 \times 400}{15}d. = 560d. = £2.\ 6s.\ 8d.$

(788) $\frac{7}{240}$ of second income $= \frac{14}{240}$ of first income $- £63$;

$\frac{1}{240}$ of second income $= \frac{2}{240}$ of first income $- £9$;

$\frac{1}{240}$ of first income $- £\frac{225}{240} = \frac{2}{240}$ of first income $- £9$;

$\therefore$ $£(9 - \frac{225}{240}) = \frac{1}{240}$ of first income;

$\therefore$ first income $= £2160 - £225 = £1935$.

(789) After the sale to A he has left $\frac{92}{100}$, or, $\frac{23}{25}$ of the flock;

after the sale to B he has left $\frac{18}{25}$ of the flock $- 90$;

after the sale to C he has left

$\frac{193}{200}$ of $\{ \frac{23}{25}$ of the flock $- 90 \}$;

$\therefore$ $\frac{193}{200}$ of $\{ \frac{23}{25}$ of the flock $- 90) = 579$;

$\therefore$ $\frac{23}{25}$ of the flock $- 90 = 600$;

$\therefore$ $\frac{23}{25}$ of the flock $= 690$;

$\therefore$ the flock consists of 750 sheep.

(790)

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             5                  128558238823
                                125
                                ───
    15       0     7500          3558
   150       4     750000        3558238
                     6016⎫
                   ──────⎪
                   756016⎬       3024064
                       16⎭       ───────
                   ────────
  1512       7     76204800       534174823
                     105889
                   ────────       534174823
                   76310689       ─────────
```

	s.	d.	
(791)	5 .	$3\frac{1}{4}$	= cost of 1 yd.
		4	
	21 .	1	= cost of 4 yd.
		9	
	189 .	9	= cost of 36 yd.
1 ft. is $\frac{1}{3}$ of 1 yd.	5 .	$3\frac{1}{4}$	= …… 1 yd.
1 ft. is $\frac{1}{3}$ of 1 yd.	1 .	$9\frac{1}{12}$	= …… 1 ft.
6 in. is $\frac{1}{2}$ of 1 ft.	1 .	$9\frac{1}{12}$	= …… 1 ft.
1 in. is $\frac{1}{6}$ of 6 in.		$10\frac{13}{24}$	= …… 6 in.
		$1\frac{109}{144}$	= …… 1 in.
	s. 199 .	$6\frac{103}{144}$	= cost of 37 yd. 2 ft. 7 in.

(792) $\frac{6}{5}$ of cost of 65 yards + $\frac{23}{20}$ cost of 65 yards
= £95. 9*s.* $4\frac{1}{2}$*d.*;
∴ $\frac{235}{100}$ of cost of 65 yards = £95. 9*s.* $4\frac{1}{2}$*d.*;
∴ $\frac{235 \times 65}{100}$ of cost of 1 yard = $\frac{45825}{2}$*d.*;
∴ $\frac{1}{100}$ of cost of 1 yard = $\frac{3}{2}$*d.*;
∴ cost per yard = 150*d.* = 12*s.* 6*d.*

(793) Weight of nitre = $(\frac{75}{100} + \frac{77}{100})$ of 10 cwt. = $15\frac{1}{5}$ cwt.
weight of sulphur = $(\frac{10}{100} + \frac{9}{100})$ of 10 cwt. = $1\frac{9}{10}$ cwt.
weight of charcoal = $(\frac{15}{100} + \frac{14}{100})$ of 10 cwt. = $2\frac{9}{10}$ cwt.

(794) Net income = $\frac{88}{100}$ of £3000 = £2640;
purchase money = £(26 × 3000) = £78000;
income from 3 per cents. = £$\frac{78000 \times 3}{97\frac{1}{2}}$ = £2400;
∴ difference = £240.

(795) The leak admits $18\frac{3}{4}$ tons of water in an hour;
∴ water gains $6\frac{3}{4}$ tons in an hour;
now $60 \div 6\frac{3}{4} = \frac{240}{27} = \frac{80}{9}$;
∴ rate = $(40 \div \frac{80}{9})$ miles per hour, or, $4\frac{1}{2}$ miles.

(796) Cost of $1\frac{3}{4}$ cwt. at 5*s.* $4\frac{1}{2}$*d.* per lb. = 1053*s.* 6*d.*;
cost of $2\frac{1}{4}$ cwt. at 3*s.* $3\frac{1}{2}$*d.* per lb. = 829*s.* 6*d.*,
whole cost = 1883*s.*;
sale of $2\frac{1}{2}$ cwt. at 4*s.* 6*d.* = 1260*s.*;
sum to be realised = 623*s.* + 376*s.* $7\frac{1}{5}$*d.* = 999*s.* $7\frac{1}{5}$*d.*

$\therefore$ rate per lb. = $\dfrac{999s.\ 7\frac{1}{5}d.}{168}$ = 5*s.* $11\frac{2}{5}$*d.*

(797) 4 per cent. on $\frac{4}{5}$ths of the capital is £32000;
$\therefore$ 4 per cent. on the whole capital is £40000;
$\therefore$ the capital is £1000000;
also, 10 per cent. on £200000 = £20000;
$\therefore$ £52000 is 52 per cent. of the receipts;
$\therefore$ receipts are £100000.

(798) $$\text{Interest} = \frac{2\frac{1}{2} \times \text{rate} \times \text{debt}}{100};$$

$$\text{discount} = \frac{2\frac{1}{2} \times \text{rate} \times \text{debt}}{100 + 2\frac{1}{2} \times \text{rate}};$$

$$\therefore \frac{\text{interest}}{\text{discount}} = \frac{100 + 2\frac{1}{2} \times \text{rate}}{100}, \text{ or, } \tfrac{87}{80} = 1 + \frac{\text{rate}}{40},$$

$$\text{or, } \frac{\text{rate}}{40} = \tfrac{7}{80}, \text{ or, rate} = 3\tfrac{1}{2}.$$

(799) 1 foot of *A* is as valuable as $\frac{9\times6}{11\times5}$, or, $\frac{54}{55}$ ft. of *B*;
53 feet of *A* weigh as much as $\frac{53}{51}$ of $\frac{561}{12}$ feet of *B*;
$\therefore$ 1 foot of *A* weighs as much as $\frac{11}{12}$ ft. of *B*;
again, 1 lb. weight of *A* is worth $\frac{702}{363}$*s.*;
also, 1 lb. weight of *B* is in length $\frac{11}{12}$ of the length of 1 lb. of *A*;
$\therefore$ 1 lb. weight of *B* is in value $\frac{55\times11}{54\times12}$ of 1 lb. of *A*;
$\therefore$ 180 lb. of *B* are worth $\frac{180\times55\times11\times702}{54\times12\times363}$*s.* = £16. 5*s.*

(800) 320 figures weigh ·475 grains;
∴ 100102 figures weigh $\frac{100102 \times \cdot 475}{320}$ grains;
weight of paper $= \frac{100102 \times 23 \times 104 \cdot 68}{10 \times 4 \times 144}$ grains
$= \frac{50051 \times 23 \times 26 \cdot 17}{720}$ grains;
∴ weight of the whole $= \frac{100102 \times \cdot 475}{320}$ grains
$+ \frac{50051 \times 23 \times 26 \cdot 17}{720}$ grains
$= \frac{120932725 \cdot 69}{2880}$ grains
$= 41990 \cdot 52975347\dot{2}$ grains.

(801) 94073 ÷ 623 = 151;
1053101 + 151 = 1053252.

(802) $\frac{4767531 - 476}{99990} = \frac{4767055}{99990} = \frac{953411}{19998}$.

(803) Cost price $= \frac{100}{75}$ of 12*s*. $= \frac{4 \times 12}{3}$*s*. = 16*s*.;
∴ I must sell it for 16*s*. + 4*s*., or, £1 per gall.

(804) Area of wainscot $= \{ (49\frac{1}{2} + 39) \times 10 \}$ sq. ft.
= 885 sq. ft.;
∴ cost $= £(\frac{885}{9} \times \frac{2}{3}) = £65\frac{5}{9}$.

(805) $\frac{\text{Rate of boat + rate of stream}}{\text{rate of boat − rate of stream}} = \frac{60}{55}$;
∴ 55 × rate of boat + 55 × rate of stream
= 60 × rate of boat − 60 × rate of stream,
∴ 115 × rate of stream = 5 × rate of boat;
∴ $\frac{\text{rate of stream}}{\text{rate of boat}} = \frac{5}{115} = \frac{1}{23}$.

(806) *A* does $\frac{3}{5}$ in 12 days and $\frac{3}{20}$ in 3 days;
∴ *A*, when working alone, does $\frac{15}{20}$, or, $\frac{3}{4}$;
∴ *A* and *B* do $\frac{1}{4}$ in 2 days;
∴ *B* does $(\frac{1}{8} - \frac{1}{20})$ daily, or, $\frac{3}{40}$ daily;
∴ *B* does the work in $13\frac{1}{3}$ days.

(807) $(4\frac{4}{23} \times 5\frac{3}{4}) \div 12 = \frac{96\times23}{23\times4\times12} = 2$;
∴ P. W. = $\frac{100}{102}$ of £2047. 13*s.* = £2007. 10*s.*;
again, interest = £1599·6722 − £1387·4
= £212·2722;
and interest for 1 year = £$\frac{1387\cdot4\times3\cdot6}{100}$ = £49·9464;
∴ number of years = $\frac{212\cdot2722}{49\cdot9464} = 4\cdot25 = 4\frac{1}{4}$.

(808) Rate in miles per hour = $\frac{6\times28\times5}{8\times30\times4}$ of $9\frac{1}{4} = 8$.

(809) Content of wall = (196 × 150 × 9) cub. in.
= 264600 cub. in.;
content of doorway = (75 × 28 × 9) cub. in.
= 18900 cub. in.;
∴ space to be occupied by brickwork = 245700 cub. in..
∴ number of bricks = $\frac{245700}{12\times3\times3} = 2275$.

(810) 9 men and 15 women do $\frac{3}{8}$ of the work daily;
4 men and 14 children do $\frac{1}{6}$ of the work daily;
∴ 13 men, 14 children, and 15 women do $\frac{13}{24}$ daily;
∴ they do the work in $1\frac{11}{13}$ days.

(811) (*a*)
$$\frac{2 + \dfrac{1}{3 - \frac{6}{31}}}{\frac{13}{8} \div \frac{7\times29}{4\times8}} = \frac{2 + \frac{31}{87}}{\frac{13}{7\times29}} = \frac{205\times7\times29}{13\times87} = 36\tfrac{31}{39};$$

(β)
$$\frac{6\frac{3}{4} + 17\frac{2}{7} - 7\frac{1}{4}}{3\frac{1}{5} + 2\frac{1}{2} - 4\frac{1}{10}} = \frac{16\frac{11}{14}}{1\frac{3}{5}} = \frac{235\times5}{14\times8} = 10\tfrac{55}{112}.$$

(812) $5\frac{3}{4} \times 4\frac{1}{2} = \frac{23}{4} \times \frac{9}{2} = \frac{207}{8}$;
∴ P. W. = $\frac{800}{1007}$ of £1942. 13*s.* 5*d.* = £1543. 6*s.* 8*d.*

(813) Area = 1681 sq. in.; ∴ side = $\sqrt{1681}$ in. = 41 in.

(814) Amount of legacy = $\frac{240}{9}$ of £19. 10*s.* = £520;
∴ amount divided = £520 − £19. 10*s.* = £500. 10*s.*;
∴ each received $\frac{\pounds500.\ 10s.}{43}$, or, £11. 12*s.* $9\frac{21}{43}$*d.*

(815) Work in foot-pounds $= 3\frac{3}{4} \times 8 \times 14 \times 50 = 21000$.

(816) Number of cub. ft. $= \frac{900 \times 88 \times 220 \times 1000}{1089} = 16000000$.

(817) Proceeds of sale $= £(93\cdot5 \times 100) = £9350$;
income from 4 per cents. $= £\frac{9350 \times 4}{102} = £366.\ 13s.\ 4d.$;
original income $= £300$;
$\therefore$ increase is £66. 13*s*. 4*d*.

(818) 5 men do $\frac{901}{1500}$ of the work in $\frac{53}{25}$ hours;
$\therefore$ 1 man does $\frac{17}{300}$ of the work in 1 hour:
$\therefore$ 3 men do $\frac{51}{100}$ of the work in 3 hours;
$\therefore$ 7 boys in 3 hours do $\frac{49}{100}$ of the work;
$\therefore$ 1 boy in 1 hour does $\frac{7}{300}$ of the work;
$\therefore$ 6 boys in 1 hour do $\frac{7}{50}$ of the work;
now $\frac{599}{1500}$ of the work remains to be done;
$\therefore$ time in hours $= \frac{599}{1500} \div \frac{7}{50} = \frac{599}{210} = 2\cdot8\dot{5}2380\dot{9}$.

(819) Area of 5 external sides
$= \{ (27 + 22) \times 13 + 27 \times 22 \}$ sq. ft.
$= (637 + 594)$ sq. ft. $= 1231$ sq. ft.;
and, neglecting the thickness of the material, tne area of the interior will also be 1231 sq. ft.;
$\therefore$ cost $= \frac{2462 \times 3}{9 \times 2}d. = 410\frac{1}{3}d. = £1.\ 14s.\ 2\frac{1}{3}d.$

(820) 12*s*. 4*d*. is $\frac{37}{60}$ of £1;
$\therefore$ he first receives $\frac{37}{60}$ of £296, or, £182. 10*s*. 8*d*.;
the deficiency is then £113. 9*s*. 4*d*.;
next he receives $\frac{3}{16}$ of £113. 9*s*. 4*d*., or, £21. 5*s*. 6*d*.;
$\therefore$ in all he receives £203. 16*s*. 2*d*.

(821) $\frac{1815020}{601} = 3020$; $\frac{1815\cdot02}{601} = 3\cdot02$; $\frac{181\cdot502}{601} = \cdot302$.

(822) $62\frac{13}{24} + \frac{1}{8} = 62\frac{16}{24} = 62\frac{2}{3}$;
$\therefore$ income $= £\frac{15040 \times 4 \times 3}{188} = £960$.

(823) Interest for 1st year = £82·95;
interest for 2nd year = £86·268;
interest for 3rd year = £89·71872;
∴ interest = £258·93672 = £258. 18*s*. 8·8128*d*.

(824) Cost of painting top and bottom = $\frac{6\times4\times2\times3}{2}$*d*. = 6*s*.;
square feet in area of sides = $\frac{82\frac{1}{2}}{1\frac{1}{2}} = \frac{165}{3} = 55$;
feet in circuit of sides = 20;
∴ height of box = $\frac{55}{20}$ ft. = 2 ft. 9 in.

(825) When the false hand goes 290 min. the true hand goes 300 min.;
∴ when the false hand goes 300 min. the true hand goes $\frac{300\times300}{290}$ min., or, $310\frac{10}{29}$ min.; that is, the true time is 5 hr. $10\frac{10}{29}$ min.

(826) 35 men in 45 days do the whole work;
∴ 7 men in 15 days do $\frac{1}{15}$ of the work;
hence 35 men in 15 days do $\frac{5}{15}$;
28 men in 15 days do $\frac{4}{15}$;
21 men in 15 days do $\frac{3}{15}$;
14 men in 15 days do $\frac{2}{15}$;
7 men in 15 days do $\frac{1}{15}$;
now $\frac{5}{15} + \frac{4}{15} + \frac{3}{15} + \frac{2}{15} + \frac{1}{15} = 1$;
∴ in 75 days the work is finished.

(827) Number of planks = $\frac{171\times160}{8\times10\times12} = \frac{171}{6} = 28\frac{1}{2}$;
weight = $\frac{171\times160\times\frac{1}{2}}{2}$ oz. = 6840 oz. = $427\frac{1}{2}$ lb.

(828) *A* does $\frac{1}{24}$ of the work daily;
∴ in half a day *A* does $\frac{1}{48}$ of the work;
hence in the two days when *A* and *B* are working together they do $\frac{7}{48}$ of the work;
∴ in 1 day *B* does $\frac{7}{96} - \frac{1}{24}$, or, $\frac{3}{96}$ of the work;
∴ *B* can do the work in 32 days.

(829) 44 shots have to be divided between centres and outers, so as to make up a score of 101;

∴ 3 × number of centres + 2 × (44 − number of centres) = 101;

∴ number of centres = 101 − 88 = 13;

∴ number of outers = 44 − 13 = 31.

(830) 30 children + 9 children + 1 child earn 90*s.*;

∴ 40 children earn 90*s.*; ∴ 1 child earns $\frac{9}{4}$*s.*;

∴ (36 + 6 + 5) children, or, 47 children earn $\frac{423}{4}$*s.*, or, £5. 5*s.* 9*d.*

		£	s.	d.	
(831)		107	10	6	= cost of 1 acre.
				9	
		967	14	6	
				3	
	2 ro. is $\frac{1}{2}$ of 1 ac.	2903	3	6	= cost of 27 ac.
	1 ro is $\frac{1}{2}$ of 2 ro.	53	15	3	= ...... 2 ro.
	20 po. is $\frac{1}{2}$ of 1 ro.	26	17	7·5	= ...... 1 ro.
	5 po. is $\frac{1}{4}$ of 20 po.	13	8	9·75	= ...... 20 po.
	1 po. is $\frac{1}{5}$ of 5 po.	3	7	2·4375	= ...... 5 po.
	$\frac{1}{3}$ po. is $\frac{1}{3}$ of 1 po.		13	5·2875	= ...... 1 po.
	$\frac{1}{3}$ po. is $\frac{1}{3}$ of 1 po.		4	5·7625	= ...... $\frac{1}{3}$ po.
			4	5·7625	= ...... $\frac{1}{3}$ po.
		£3001	14	9·5	= cost of 27 ac. 3 ro. 26$\frac{2}{3}$ po.

(832) Interest on £124 in 3 years = £14·88;

interest on £124 in 1 year = £4·96;

∴ rate per cent. = £$\frac{100 \times 4 \cdot 96}{124}$ = £4;

then interest on £1245 = £373·5;

interest on £1245 for 1 year at 4 per cent. = £49·8;

∴ number of years = $\frac{373 \cdot 5}{49 \cdot 8} = \frac{1245}{166} = 7\frac{1}{2}$.

(833) 10 men with 14 boys can earn $\frac{2 \times £7.\ 13s.}{6}$ in 1 day;
10 men with 15 boys can earn $\frac{5 \times £2.\ 2s.}{4}$ in 1 day;
∴ 1 boy can earn $\frac{£10.\ 10s.}{4} - \frac{£15.\ 6s.}{6}$, or, 1*s.* 6*d.* in 1 day;
∴ 2 men can earn 42*s.* – 18*s.*, or, 24*s.* in 4 days;
∴ 1 man can earn 3*s.* in 1 day;
∴ time required $= \frac{60 \times 20}{18+18} = \frac{1200}{36} = 33\frac{1}{3}$ days.

(834) He buys 1150 oysters for 60*s.*;
he sells 1150 oysters for $\frac{1150 \times 4}{12 \times 3}$*s.*, or, $127\frac{7}{9}$*s.*;
∴ gain per cent. $= \frac{67\frac{7}{9} \times 100}{60} = \frac{3050}{27} = 112\frac{26}{27}$.

(835) *B* runs 1749 yards while *C* runs 1696 yards;
∴ *B* runs 3 miles while *C* runs $\frac{1696}{1749}$ of (1760 × 3) yards,
or, 5120 yards;
∴ *B* wins by (5280 – 5120) yards, or, 160 yards.

(836) $\frac{6}{240}$ of $\frac{1}{3}$ of $\frac{3}{11}$ of the income of the estate $= £\frac{11}{2}$;
∴ income $= £\frac{11 \times 11 \times 249}{6 \times 2} = £2420$.

(837) An income of $£4\frac{1}{4}$ in the $5\frac{1}{2}$ per cents. costs $£\frac{4\frac{1}{4} \times 105}{5\frac{1}{2}}$,
or, $£81\frac{3}{22}$;
now $\frac{3}{22}$ is greater than $\frac{1}{2}$, and therefore the $4\frac{1}{4}$ per
cents. is the better investment.

(838) While *B* walks 12 miles, *A* walks $\frac{9 \times 12}{10}$, or, 10·8 miles
∴ for an even race *A* must get 1·2 miles start;
∴ *A* has $\frac{1{\cdot}2 \times 60 \times 60}{5{\cdot}4}$ seconds, or, 800 seconds start;
hence *B* can give 799 seconds start and win.

(839) Cost price $= \frac{100}{106}$ of £132·5 = £125;
∴ gain per cent. $= £\frac{10 \times 100}{125} = £8$.

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(840) 1 lb. troy = $\frac{576}{700}$ of 1 lb. avoirdupois;

∴ 1 oz. troy = $\frac{576 \times 16}{700 \times 12}$ of 1 oz. avoirdupois;

∴ number of pennies = $\frac{175 \times 576 \times 16 \times 3}{700 \times 12}$ = 576;

next, 5 halfpennies weigh $\frac{700 \times 12}{576 \times 16}$ oz. troy,

or, $\frac{175}{192}$ oz. troy;

∴ 1 halfpenny weighs $\frac{35}{192}$ oz. troy;

∴ 192 is the number of halfpennies required.

(841) 401 × 523 = 209723; and 3150501 − 209723 = 2940778.

(842)

```
         4957·5681 ( 70·41
         49
       ┌──────────
  1404 │  5756
       │  5616
       ├──────────
 14081 │  14081
       │  14081
       └──────────
```

$\frac{129 \cdot 4947}{60 \cdot 75} = \frac{14 \cdot 3883}{6 \cdot 75} = \frac{1 \cdot 5987}{\cdot 75}$ $= \frac{\cdot 5329}{\cdot 25}$, and the square root of this fraction is $\frac{\cdot 73}{\cdot 5}$ = 1·46.

(843) Interest on £157½ for 5 years is £31½;

interest on £157½ for 1 year is £6$\frac{3}{10}$;

interest on £100 for 1 year = £$\frac{6\frac{3}{10} \times 100}{157\frac{1}{2}}$ = £$\frac{63 \times 100}{315 \times 5}$

= £4.

(844) Amount of stock purchased = £$\frac{6825 \times 100}{91}$ = £7500;

money from sale of £5000 stock = £93½ × 50

= £4675;

money from sale of £2500 stock = £85 × 25

= £2125;

∴ loss in money = £6825 − £6800 = £25;

income from first investment = £(75 × 3) = £225;

income from second investment = £(68 × 4½)

= £306;

∴ gain in income = £306 − £225 = £81.

(845) Interest on £273·75 for 10 days = $£\frac{273\cdot75\times5\times10}{365\times100}$
$= £\cdot375$;
$\therefore$ value of first bill = £273·75 + £·375 = £274. 2*s.* 6*d.*;
P. W. of $£456\frac{7}{8} = \frac{100}{100\frac{10}{73}}$ of $£456\frac{7}{8} = £\frac{7300\times3655}{7310\times8}$
$= £\frac{730\times5}{8}$;
$\therefore$ value of second bill = £456. 5*s.*

(846) That which he bought for £100 he sells for £175, but of this he receives only £43¾, and therefore he loses 56¼ per cent.

(847) *A*'s rates are successively 400 yd., 399 yd., 398 yd., 397 yd., and these reckoned backwards must also be *B*'s rates: that is, *B* starts at a pace of 397 yd. a minute.

(848) Suppose the cask to contain 12 gallons, of which 9 are wine and 3 water,
then $9 - \frac{3}{4}$ of part drawn = quantity of wine remaining;
and $3 - \frac{1}{4}$ of part drawn = quantity of water remaining;
$\therefore$ $3 + \frac{3}{4}$ of part drawn = quantity of water in the vessel when water is substituted for the part drawn off;
$\therefore$ $9 - \frac{3}{4}$ of part drawn $= 3 + \frac{3}{4}$ of part drawn;
$\therefore$ $\frac{6}{4}$ of part drawn = 6;
$\therefore$ part drawn = 4 gallons, that is, one-third of the mixture.

(849) £420. 16*s.* 1½*d.* = 100873·5*d.*, and 4*s.* 2*d.* = 50*d.*;
$\therefore$ number of dollars $= \frac{100873\cdot5}{50} = \frac{201747\cdot0}{100}$
= 2017 dol. 47 cents.

(850) 17 mi. 6 fur. 82 yd. 1½ ft. = 93967·5 feet
$= \frac{93967\cdot5}{1760\times3}$ miles
$= \frac{8\times93967\cdot5}{5\times1760\times3}$ kilom.
= 28·475 kilom.

(851)

$$\begin{array}{r|r@{\;.\;}r@{\;.\;}ll}
 & \text{£} & \text{s.} & \text{d.} & \\
 & 57 & 6 & 3 & = \text{cost of 1 ton} \\
 & \multicolumn{3}{r}{10} & \\
\cline{2-4}
 & 573 & 2 & 6 & \\
 & \multicolumn{3}{r}{10} & \\
\cline{2-4}
 & 5731 & 5 & 0 & = \text{cost of 100 tons} \\
\text{2 qr. is } \frac{1}{40} \text{ of 1 ton} & 171 & 18 & 9 & = \;.\,.\,.\,.\,.\; \text{3 tons} \\
\text{1 qr. is } \frac{1}{2} \text{ of 2 qr.} & 1 & 8 & 7\frac{7}{8} & = \;.\,.\,.\,.\,.\; \text{2 qr.} \\
\text{14 lb. is } \frac{1}{2} \text{ of 1 qr.} & & 14 & 3\frac{15}{16} & = \;.\,.\,.\,.\,.\; \text{1 qr.} \\
\text{2 lb. is } \frac{1}{7} \text{ of 14 lb.} & & 7 & 1\frac{31}{32} & = \;.\,.\,.\,.\,.\; \text{14 lb.} \\
 & & 1 & 0\frac{9}{32} & = \;.\,.\,.\,.\,.\; \text{2 lb.} \\
\cline{2-4}
\multicolumn{1}{r}{} & \text{£}5905 & 14 & 11\frac{1}{16} & = \text{cost of 103 tons} \\
\multicolumn{1}{r}{} & \multicolumn{3}{r}{} & \quad\;\; \text{3 qr. 16 lb.}
\end{array}$$

(852) Interest on £176. 5*s*. for 1 year = £5. 5*s*. 9*d*.;
∴ rate per cent. = $\frac{100}{176\cdot25}$ of $5\frac{23}{80}$ = 3;
interest on £1075·5 for 1 year = £32·265;
and £1559·475 − £1075·5 = £483·975;
∴ time in years = 483·975 ÷ 32·265 = 15.

(853)

$$\begin{array}{r}
\cdot078125\;)\;21\cdot843750\;(\;279 \\
156250 \\
\cline{1-1}
621875 \\
546875 \\
\cline{1-1}
750000 \\
703125 \\
\cline{1-1}
46875
\end{array}$$

the remainder is ·046875 gall. = ·375 pint = $\frac{3}{8}$ pint.

(854) Each has $\frac{8}{3}$ loaves for his meal;
∴ the first gives the third $\frac{7}{3}$ loaves;
the second gives the third $\frac{1}{3}$ loaf;
∴ he pays the first 7 halfpence and the second 1 halfpenny.

(855) $\frac{2}{3} \times 2\frac{1}{2} = \frac{5}{3}$;

∴ P. W. $= £\frac{100 \times 44\frac{11}{60}}{\frac{5}{3}} = £\frac{100 \times 2651 \times 3}{5 \times 60} = £2651$;

∴ amount of bill = £2651 + £44. 3*s.* 8*d.* = £2695. 3*s.* 8*d.*

(856) Income $= £\frac{5012 \times 3}{89\frac{1}{2}} = £\frac{5012 \times 6}{179} = £168$;

decrease of income = 168*d.* = 14*s.*

(857)
                                   s. *d.*
Cost of strawberries = 10 . 6
cost of cream = 1 . 3
cost of sugar = 2 . 2
cost of ice = 6
whole cost = *s.*14 . 5

the 2 boys pay $\frac{4}{7}$ of 14*s.* 5*d.*, or, 8*s.* $2\frac{6}{7}$*d.*;

∴ they receive as change 1*s.* $9\frac{1}{7}$*d.*

(858) 9 rabbits eat as much as 15 guineapigs;

∴ time = $\frac{5}{20}$ of a month, or, $\frac{1}{4}$ of a month.

(859) Cost price of first horse = $\frac{100}{125}$ of £100 = $£\frac{400}{5}$ = £80;

cost price of second horse = $\frac{100}{75}$ of £100 = $£\frac{400}{3}$

= $£133\frac{1}{3}$;

∴ he loses $£213\frac{1}{3}$ − £200, or, £13. 6*s.* 8*d.*

(860) £2 is the interest of the discount (see Question 665) for 6 months;

£2 is also the interest of £100 for 6 months;

∴ discount = £100 and interest = £102;

∴ the sum $= £\frac{102 \times 100}{2} = £5100$.

(861) $\frac{58620}{990} \times \frac{4605}{990} = \frac{1954}{33} \times \frac{1535}{330} = \frac{299939}{1089} = 275{\cdot}41\ldots,$

(862) $500 \times 12 = 6000$ ∴ *A*'s share $= \frac{60}{259}$ of £$932\frac{2}{5}$
$= £216$;
$700 \times 10 = 7000$ *B*'s share $= \frac{70}{259}$ of £$932\frac{2}{5}$
$= £252$;
$650 \times 10 = 6500$ *C*'s share $= \frac{65}{259}$ of £$932\frac{2}{5}$
$= £234$;
$800 \times 8 = 6400$ *D*'s share $= \frac{64}{259}$ of £$932\frac{2}{5}$
$= £230.$ 8*s.*
sum $= 25900$

(863) Income from the company = £12. 10*s.*;
income from Cape stock $= £\frac{250 \times 6}{100} = £14.$ 5*s.* $8\frac{4}{7}$*d.*;
result from first investment = £250 + £62. 10*s.*
= £312. 10*s.*;
result from second investment $= \frac{20}{21}$ of £250 + £$71\frac{3}{7}$
$= £307\frac{11}{21}$;
∴ the first is better by £$312\frac{1}{2}$ − £$307\frac{11}{21}$, or, £$2\frac{41}{42}$.

(864) Fare for 1 mile $= \frac{8 \times 6}{5}$ cent. $= \frac{8 \times 6 \times 240}{5 \times 2520}$*d.* $= \frac{32}{35}$*d.*;
∴ the fares are as 32 : 35.

(865) The up train performs the journey in 110 min., the down train in 132 min.;
∴ their rates are as 6 : 5;
at 3.30 P.M. the up train has gone over $\frac{20}{110}$ or $\frac{2}{11}$ of the distance;
we have now to divide $\frac{9}{11}$ in the ratio 6 : 5, and we find that when the trains meet the up train has gone over $\frac{54}{121} + \frac{2}{11}$ of the whole distance;
the up train passes over $\frac{1}{11}$ of the whole distance in 10 minutes;
the up train passes over $\frac{76}{121}$ of the whole distance in $\frac{760}{11}$ minutes;
∴ time of meeting is 3 hr. 10 min. + 1 hr. $9\frac{1}{11}$ min., or, 4 hr. $19\frac{1}{11}$ min.

(866) $(6\frac{6}{17} \times 5\frac{2}{3}) \div 12 = 3$;

∴ P. W. = $\frac{100}{103}$ of £2034·25 = £1975;

∴ discount = £2034. 5*s*. − £1975 = £59. 5*s*.

(867) On 1387400 mils the interest for 3 years is 187299 mils, and the interest for 1 year is 62443 mils;

∴ rate = $\frac{62443\frac{1}{3}\times100}{13874}$ = $4\frac{1}{2}$.

(868) Rate of second boat = $\frac{6\times34\times4}{8\times27\times5}$ of $\frac{75}{8}$ miles per hr.

= $7\frac{1}{12}$ miles.

(869) Content of brickwork = { (224 × 150 − 75 × 32) × 9 } cub. ft.

= { (33600 − 2400) } × 9 cub. ft.

= (31200 × 9) cub. ft.;

number of bricks = $\frac{31200\times9}{12\times4\times3}$ = 1950.

(870) 3 men and 5 women do $\frac{1}{8}$ of the work daily;

1 man and 3 children do $\frac{1}{24}$ of the work daily;

∴ 4 men and 5 women and 3 children do $\frac{1}{6}$ daily;

but 5 women and 3 children do $\frac{1}{12}$ daily;

∴ 4 men do $\frac{1}{12}$ daily;

.. a man does $\frac{1}{48}$ daily;

hence 5 women do $\frac{1}{8} - \frac{1}{16}$, or, $\frac{1}{16}$ daily;

∴ a woman does $\frac{1}{80}$ daily;

also 3 children do $\frac{1}{12} - \frac{1}{16}$, or, $\frac{1}{48}$ daily;

∴ a child does $\frac{1}{144}$ daily;

thus their strength is as $\frac{1}{48} : \frac{1}{80} : \frac{1}{144}$, or, $\frac{1}{3} : \frac{1}{5} : \frac{1}{9}$, or, $\frac{45}{3} : \frac{45}{5} : \frac{45}{9}$, or, 15 : 9 : 5.

(871)

	£	s.	d.	
2*s*. 6*d*. is $\frac{1}{8}$ of £1	2005	6	8	= tax at £1 in the £
1*s*. 3*d*. is $\frac{1}{2}$ of 2*s*. 6*d*.	250	13	4	= ..... 2*s*. 6*d*. in the £
$1\frac{1}{2}$*d*. is $\frac{1}{10}$ of 1*s*. 3*d*.	125	6	8	= ..... 1*s*. 3*d*. in the £
	12	10	8	= ..... $1\frac{1}{2}$*d*. in the £
	£388	10	8	= tax at 3*s*. $10\frac{1}{2}$*d*. in the £

(872) $62\frac{19}{24} - \frac{1}{8} = 62\frac{16}{24} = 62\frac{2}{3}$;
∴ money received = £$\frac{15240 \times 62\frac{2}{3}}{100}$ = £9550. 8*s*.

(873) Number of shillings in the £ = $\frac{4687500 \times 20}{7500000} = 12\frac{1}{2}$;
the debt = $\frac{20}{12\frac{1}{2}}$ of £1466. 12*s*. $9\frac{3}{4}$*d*. = £2346. 12*s*. 6*d*

(874) 27 yd. 2 ft. 9 in. = 1005 in.; 17 yd. 1 ft. 11 in.
= 635 in.;
∴ value of 1st material = $\frac{7}{8}$ of $\frac{1005}{635}$ of 1270*d*.
= £7. 6*s*. $6\frac{3}{4}$*d*.

(875) Value of contents = $\frac{9}{11}$ of £3. 6*s*. $5\frac{1}{2}$*d*. = £2. 14*s*. $4\frac{1}{2}$*d*.

(876) Cost of 1 fork = $\frac{1}{12}$ of $\frac{100}{108\frac{1}{3}}$ of £14. 4*s*. $3\frac{1}{2}$*d*.
= £1. 1*s*. $10\frac{11}{26}$*d*.;
cost per oz. = 5*s*. 2*d*. + 1*s*. 6*d*. + 1*s*. = 7*s*. 8*d*.;
∴ number of oz. = $\frac{262\frac{11}{26}}{92} = \frac{6823}{2392} = 2\frac{2039}{2392}$.

(877) P. W. = $\frac{100}{135}$ of £506. 15*s*. $1\frac{1}{2}$*d*. = £375. 7*s*. 6*d*.;
amount of interest = £703. 16*s*. $6\frac{3}{4}$*d*. − £375. 7*s*. 6*d*
= £328. 9*s*. $0\frac{3}{4}$*d*.;
interest for 1 year = £13. 2*s*. $9\frac{3}{20}$*d*.;
∴ number of years = the number of times that
£13. 2*s*. $9\frac{3}{20}$*d*. is contained in £328. 9*s*. $0\frac{3}{4}$*d*.,
which is 25.

(878) Interest on £150. 10*s*. for 4 months = £2. 10*s*. 2*d*.;
£253. 7*s*. 8*d*. remain to be paid, and the debtor ought to keep this sum beyond the original time of payment till the interest amounts to £2. 10*s*. 2*d*.;
interest for 1 month = £$\frac{15203}{14400}$;
and £2. 10*s*. 2*d*. = £$\frac{301}{120}$;
∴ number of months = $\frac{301 \times 14400}{120 \times 15203} = 2\frac{5714}{15203}$.

(879) Cost price = $\frac{100}{107\frac{1}{2}}$ of $54d. = \frac{40 \times 54}{43}d.$;

∴ 180 times the new price in pence + $(45 \times 54)d.$
$= \frac{11}{10} \times 225 \times \frac{40 \times 54}{43}d.$;

∴ 180 times new price = $(\frac{534600}{43} - 2430)d. = \frac{430110}{43}d.$;

∴ new price = $\frac{430110}{180 \times 43}d. = \frac{4779}{86}d.$ = 4*s*. $7\frac{49}{86}d.$

(880) *A*'s coals are valued at 27 × £1. 5*s*., or, £33. 15*s*.;
B's hops are valued at 6 × $\frac{10}{9}$ × £2. 14*s*., or, £18;

∴ *A* gets in cash £15. 15*s*.

(881) (*a*) $3 - \cfrac{1}{2 - \frac{5}{31}}$ divided by $1 + \cfrac{1}{4 + \cfrac{1}{3 - \frac{2}{7}}}$

$= 3 - \frac{31}{57}$ divided by $1 + \cfrac{1}{4 + \frac{7}{19}}$

$= \frac{140}{57} \div (1 + \frac{19}{83}) = \frac{140}{57} \div \frac{102}{83} = \frac{5810}{2907} = 1\frac{2903}{2907}$.

(*β*) $\dfrac{7\frac{5}{6} - \frac{13}{6}}{6\frac{1}{2} - 3\frac{1}{2}} = \dfrac{5\frac{2}{3}}{3} = \frac{17}{9} = 1\frac{8}{9}$.

(882)

$$\begin{array}{r|l} & 1706\cdot5161\,(41\cdot31 \\ & 16 \\ \hline 81 & 106 \\ & 81 \\ \hline 823 & 2551 \\ & 2469 \\ \hline 8261 & 8261 \\ & 8261 \\ \hline \end{array}$$

$\frac{86\cdot9211}{54\cdot75} = \frac{28\cdot9737}{18\cdot25}$, and 73 will then divide numerator and denominator, giving $\frac{\cdot3969}{\cdot25}$, of which the square root is $\frac{\cdot63}{\cdot5}$, or, $\frac{6\cdot3}{5}$, or, 1·26.

(883) Interest for the first year = £162·265
interest for the second year = £170·37825
interest for the third year = £178·8971625

∴ whole interest = £511·5404125

(884) Cost price = 300*s.*; selling price = $\frac{2100}{12} \times \frac{5}{2}$*s.*
= $437\frac{1}{2}$*s.*;
∴ his gain = $137\frac{1}{2}$*s.*, or, £6. 17*s.* 6*d.*;
gain per cent. = $137\frac{1}{2} + 3 = 45\frac{5}{6}$.

(885) *A* runs 880 yards while *B* runs 800 yards;
then *B* runs 960 yards while *A* runs $\frac{9}{10}$ of 960 yards,
or, 864 yards;
∴ *B* runs 1760 yards while *A* runs 1744 yards;
∴ *B* wins by 16 yards.

(886) For an income of £6 in the Indian stock I must pay
$\frac{6}{10}$ of £215, or, £129;
∴ the Colonial stock is the better to invest in;
income from Indian stock = £$\frac{4515 \times 10}{2 \times 215}$ = £105;
income from Colonial stock = £$\frac{4515 \times 6}{2 \times 105}$ = £129;
∴ total income = £234.

(887) The ordinary train goes in 117 minutes as far as the
express in 63 minutes;
∴ their rates are as 63 : 117, or, 7 : 13;
hence we have to divide the time between 9 A.M. and
2 P.M., that is 5 hours, into two parts in the ratio
of 7 : 13;
∴ express takes $\frac{7}{20}$ of 5 hours, or, 1 hr. 45 min.

(888) L. C. M. of 21 and 19 is 21 × 19, or, 399;
suppose she buys 399 eggs for 19*s.*,
and 399 eggs for 21*s.*;
then 798 eggs cost her 40*s.*;
she sells them for $\frac{798}{20}$*s.*, or, 39·9*s.*;
∴ on 40*s.* she loses $\frac{1}{10}$*s.*;
∴ loss per cent. = $\frac{10}{4} \times \frac{1}{10} = \frac{1}{4}$.

(889) After the first sale he has left $\frac{1}{2}$ his stock $-$ 1;
after the second sale he has left $\frac{1}{4}$ his stock $- \frac{1}{2} - 1$;
after the third sale he has left $\frac{1}{8}$ his stock $- \frac{1}{4} - \frac{1}{2} - 1$;
after the fourth sale he has left $\frac{1}{16}$ his stock $- \frac{1}{8} - \frac{1}{4} - \frac{1}{2} - 1$;
and then he has none left;
$\therefore$ $\frac{1}{16}$ his stock $= 1 + \frac{1}{2} + \frac{1}{4} + \frac{1}{8} = \frac{15}{8}$;
$\therefore$ his stock $=$ 16 times $\frac{15}{8}$, or, 30.

(890) Length of carpeted space $= 18\frac{5}{6}$ ft., and its breadth $= 14$ ft.;
$\therefore$ area of carpet $= (18\frac{5}{6} \times 14)$ sq. ft. $= \frac{113 \times 7}{3}$ sq. ft.;
$\therefore$ length of carpet required $= \frac{791}{3 \times 2}$ ft. $= 131\frac{5}{6}$ ft.

(891) P. W. $= \frac{100}{120}$ of £1344. 8*s.* $= \frac{5}{6}$ of £1344. 8*s.*;
$\therefore$ discount $= \frac{1}{6}$ of £1344. 8*s.* $=$ £224. 1*s.* 4*d.*

(892) $\frac{7235621 - 7235}{99900} = \frac{7228386}{99900} = \frac{803154}{11100} = \frac{133859}{1850}$.

(893) Area of side $= \frac{5290}{10}$ sq. inches $= 529$ sq. in.;
$\therefore$ length of side $= \sqrt{529}$ in. $= 23$ in.

(894) Water passing in a minute
$= \frac{1 \cdot 109 \times 1760 \times 3 \times 60 \times 6 \times 1728 \times 4}{1109 \times 60}$ gall.
$= \frac{1760 \times 3 \times 6 \times 1728 \times 4}{1000}$ gall. $= 218972 \cdot 16$ gall.

(895) Money from sale of 4 per cents. $= £\frac{1170 \times 90}{100} = £1053$;
income from 6 per cents. $= £\frac{1053 \times 6}{108\frac{1}{3}} = £58 \cdot 32$;
income from 4 per cents. $= £\frac{1170 \times 4}{100} = £46 \cdot 8$;
$\therefore$ increase of income $= £11 \cdot 52 =$ £11. 10*s.* $4\frac{4}{5}$*d.*

(896) $(240 + 36 + 4)$*d.* × number of sovereigns = value of the coins in pence;
$\therefore$ 280*d.* × number of sovereigns $= (280 \times 240)$*d.*;
$\therefore$ number of sovereigns $= 240$;
$\therefore$ number of shillings $= 720$;
and number of pence $= 960$.

(897) The man starting from *A* finishes his walk in $\frac{3}{4}+\frac{48}{21}$, or, $3\frac{1}{28}$ hours;

in $3\frac{1}{28}$ hours the man starting from *B* goes $3\frac{1}{28} \times 3\frac{1}{2}$ miles, or, $10\frac{5}{8}$ miles; and he has therefore $4\frac{3}{8}$ miles still to walk.

(898) 24 men and 15 boys reap 174 acres in 6 days;
24 men and 28 boys reap 200 acres in 6 days;
∴ 13 boys reap 26 acres in 6 days;
∴ 1 boy reaps $\frac{1}{3}$ acre in 1 day;
then 8 men reap 24 acres in 3 days;
∴ 1 man reaps 1 acre in 1 day;
∴ 3 men and 6 boys will reap 15 acres in 3 days.

(899) Cost price of the tea sold per lb. $= \frac{100}{120}$ of 6*s.* = 5*s.*;
∴ he gains 1*s.* on each lb. of the 4*s.* tea and loses 6*d.* on each lb. of the 5*s.* 6*d.* tea, and he must therefore mix them in the ratio 1 : 2.

(900) For an income of £6 in New Zealand stock I pay £$\frac{6\times98}{5}$, or, £$119\frac{3}{5}$;
∴ the Victoria stock is the better investment.

(901) $$\frac{\frac{5}{6}+\frac{11}{45}-\frac{11}{18}}{\frac{43}{7}\times\frac{7}{2}-\frac{7\times7\times9}{3\times2\times7}+\frac{8}{5}} = \frac{\frac{7}{15}}{\frac{63}{5}} = \frac{1}{27};$$
$$\frac{40}{55}\times\frac{11}{7}\times\frac{21}{4}+\frac{1}{3}+\frac{17}{27} = 6+\frac{1}{3}+\frac{17}{27} = 6\frac{26}{27};$$
$$6\frac{26}{27}+\frac{1}{27} = 7.$$

(902) Amount of assessment $= \frac{240}{33}$ of £81. 19*s.* = £596.

(903) For an income of £3 in the $3\frac{1}{2}$ per cents. I must pay $\frac{3\times96\frac{3}{4}}{3\frac{1}{2}}$, or, £$82\frac{13}{14}$;
∴ the former stock is the better investment;
income from $3\frac{1}{2}$ per cents. = £$\frac{5000\times3\frac{1}{2}}{96\frac{3}{4}}$ = £$\frac{70000}{387}$;
income from 3 per cents. = £$\frac{5000\times3}{93\frac{1}{8}}$ = £$\frac{24000}{149}$;
difference = £$\frac{10430000-9288000}{57663}$ = £$19\frac{46403}{57663}$.

904) From 9 A.M. on Monday to 2 P.M. on Friday there are $4\frac{5}{24}$ days;

∴ difference between the watches = $(3\frac{1}{2} \times 4\frac{5}{24})$ min.
= 14 min. $43\frac{3}{4}$ sec.

905) 6 men reap 35 acres in 7 × 12 hours;
1 man reaps 1 acre in $\frac{7\times12\times6}{35}$ hours;
9 men reap 45 acres in $\frac{45\times7\times12\times6}{9\times35}$ hours, or, 72 hours;
∴ they will take 9 days.

(906) When wheat is 15*s.* a bushel 8 men can be fed 12 days;
when wheat is 1*s.* a bushel 1 man can be fed
(12 × 15 × 8) days;
when wheat is 12*s.* a bushel 6 men can be fed $\frac{12\times15\times8}{12\times6}$,
or, 20 days.

(907) Number of revolutions are respectively $\frac{7000}{6}$; $\frac{7014}{6}$; $\frac{7000}{7}$; $\frac{7014}{7}$, that is, $1166\frac{2}{3}$; 1169; 1000; 1002.

(908) 2 oxen eat as much as $\frac{14}{5}$ horses;
∴ number of days = $\dfrac{7\times87}{\frac{14}{5}+3}$ days, or, $\frac{7\times87\times5}{29}$ days,
or, 105 days.

(909) The tree grows 36 in., 35 in., 34 in., ... 3 in., 2 in., 1 in. in each of the 36 years of its growth, or, which is the same thing, taking terms equidistant from the beginning and end, (37 × 18) inches, or, $\frac{37}{2}$ yd.;
∴ value of tree = $(\frac{37}{2} \times \frac{37}{2} \times \frac{37}{2})$*d.* = $\frac{50653}{8}$*d.*
= £26. 7*s.* $7\frac{5}{8}$*d.*

(910) Money from sale of 3 per cents. = £$(32 \times 86\frac{1}{4})$
= £2760;
income from the 4 per cents. = £$\frac{2760\times4}{115}$ = £96;
original income = £(32 × 3) = £96;
∴ there is no alteration.

(911) $({}_{1}\frac{6}{1000}$ of 500*d.* $+ \frac{3420}{990}$ of 66*s.*) $\times \frac{60}{11}$
$= (£11.\ 8s.\ 3d.) \times \frac{60}{11} = £62.\ 5s.$

(912) *B*'s work in 24 hours = *A*'s work in 20 hours;
∴ *A* could do $\frac{1}{2}$ the work in (12 + 20) hours, or, 32 hours;
∴ *C* does $\frac{1}{2}$ the work in $\frac{9}{5}$ of 32 hours, or, $57\frac{3}{5}$ hours.

(913) The 13 loaves equally divided give $4\frac{1}{3}$ loaves to each;
∴ the man who has 8 loaves gives $3\frac{2}{3}$;
and the man who has 5 loaves gives $\frac{2}{3}$;
∴ they must be paid in the proportion of 11 : 2.

(914) We have to divide a score of 206 between 79 hits;
∴ 3 × number of centres + 2 × (79 − number of centres)
= 206;
∴ number of centres = 206 − 158 = 48;
and ∴ number of outers = 79 − 48 = 31.

(915) $2\,(4 \times 2\frac{1}{2} + 4 \times 3 + 3 \times 2\frac{1}{2})$ sq. ft. = 59 sq. ft.;
∴ cost $= \frac{59 \times 15}{9}d. = 8s.\ 2\frac{1}{3}d.$

(916) $1d. = \frac{1}{12}s. = \cdot 08\dot{3}s.$;
∴ ·083333 is the decimal required.

(917) $\frac{2}{3}$ of Robert's debt to Charles + 10*d.* = Robert's debt to Charles;
∴ $\frac{1}{3}$ of Robert's debt to Charles = 10*d.*;
∴ Robert's debt to Charles = 2*s.* 6*d.*

(918) The time by *the clock* (though not by *the sun-dial*) is just midway between the times of rising and setting;

$$\therefore \text{ time} = 4\text{ h. }15\text{ m.} + \frac{7\text{ h. }45\text{ m.} + 7\text{ h. }54\text{ m.}}{2}$$

$$= 4\text{ h. }15\text{ m.} + 7\text{ h. }49\text{ m. }30\text{ s.} = 12\text{ h. }4\text{ m. }30\text{ s.};$$

that is 4 min. 30 sec. P.M.

(919) Instead of £3 he gets £3 − 1*s.* 6*d.*, or, £$2\frac{37}{40}$;

∴ price paid for each £100 stock = £$\dfrac{2\frac{37}{40}\times 100}{3\frac{1}{4}}$

$= £\frac{117\times 100\times 4}{13\times 40} = £90$;

∴ price of stock = $89\frac{7}{8}$;

again, since £3 − 3*s.* 9*d.* = £$2\frac{195}{240}$;

percentage = $\dfrac{2\frac{195}{240}\times 100}{90} = \frac{675\times 100}{240\times 90} = 3\frac{1}{8}$.

(920) The first man walks $\frac{4\times 1760\times 10}{60\times 60}$ yd., or, $19\frac{5}{9}$ yd. in 10 seconds;

∴ the train goes $(88 + 19\frac{5}{9})$ yd., or, $107\frac{5}{9}$ yd. in 10 seconds;

∴ $(\frac{9}{10}$ of $107\frac{5}{9})$ yd., or, $96\frac{4}{5}$ yd. in 9 seconds;

the second man walks $96\frac{4}{5}$ yd. − 88 yd., or, $8\frac{4}{5}$ yd. in 9 seconds;

∴ rate in miles per hour $= \dfrac{8\frac{4}{5}\times 60\times 60}{9\times 1760} = 2$.

(921) $\frac{21396\cdot 2}{527} = 40\cdot 6$; $\frac{2139\cdot 62}{527} = 4\cdot 06$;

$\frac{213962000000}{527} = 406000000$.

(922) $\frac{6885}{9900}\times\frac{5250}{9900} = \frac{153}{220}\times\frac{35}{66} = \frac{51\times 7}{44\times 22} = 36\cdot 880165\ldots\ldots$

(923) $4\frac{5}{6}\times 4\frac{3}{4} = \frac{29\times 19}{6\times 4} = \frac{551}{24}$;

∴ P. W. $= \dfrac{100}{100\frac{551}{24}}$ of £$3073\frac{230}{240}$;

$= £\frac{2400\times 737750}{2951\times 240} = £2500$;

∴ discount = £3073. 19*s.* 2*d.* − £2500 = £573. 19*s.* 2*d.*

(924) 8*d.* in the £ is paid by £500 assets;

∴ debts = $\frac{240}{8}$ of £500 = £15000;

and assets = $\frac{1}{3}$ of the debts = £5000.

(925) 1 th. = 18 kr. + 22 kr. + $\frac{1}{3}$ th. + 30 kr.;

∴ $\frac{2}{3}$ th. = 70 kr.;

∴ 1 th. = 105 kr.;

∴ 4 th. = 420 kr. = 7 gulden.

(926) He walks back in $(3\frac{3}{4} - \frac{1}{2} \text{ of } 2\frac{1}{2})$ hrs., or, $2\frac{1}{2}$ hours ;
$\therefore$ he could walk both ways in 5 hours.

(927) $\frac{1}{2}$ of the constituency vote for *A* ;
$\frac{1}{4}$ of the constituency vote for *B* ;
$\frac{2}{3}$ of $\frac{1}{4}$ of the constituency vote for *D* and *E* ;
now $\frac{1}{2} + \frac{1}{4} + \frac{1}{6} = \frac{6+3+2}{12} = \frac{11}{12}$;
$\therefore$ $\frac{1}{12}$ of the constituency $= 540$, and $\therefore$ number of electors $= 6480$.
A's votes are $\frac{6480}{2}$, or, 3240 ;
B's votes are $\frac{4}{10}$ of $3240 + \frac{1}{2}$ of 3240, or, 2916 ;
C's votes are $\frac{3}{10}$ of $3240 + \frac{3}{10}$ of 3240, or, 1944 ;
D's votes are $\frac{2}{10}$ of $3240 + \frac{1}{10}$ of $3240 + \frac{2}{3}$ of 1620, or, 2052 ;
E's votes are $\frac{1}{10}$ of $3240 + \frac{1}{10}$ of $3240 + \frac{2}{3}$ of 1620, or, 1728.

(928) He walks 1 English mile in 15 min. ;
$\therefore$ 1 German mile in $\frac{15}{.2136}$ min., or, $\frac{6250}{89}$ min. ;
$\therefore$ he walks it in 1 hr. $10\frac{20}{89}$ min.

(929) $\frac{101}{100}$ of cost of the watch $= \frac{95}{100}$ of cost of the watch + £3 ;
$\therefore$ $\frac{6}{100}$ of cost of the watch = £3 ;
$\therefore$ cost of the watch = £50 ;
hence the French maker received $\frac{100}{125}$ of £50, or, £40.

(930) $\frac{\text{Distance in miles}}{4} = \text{the certain time in hours} + \frac{1}{12}$;

$\frac{\text{distance in miles}}{5} = \text{the certain time in hours} - \frac{1}{6}$;

$\therefore \frac{\text{distance in miles}}{4} - \frac{1}{12} = \frac{\text{distance in miles}}{5} + \frac{1}{6}$;

$\therefore \frac{\text{distance in miles}}{4} - \frac{\text{distance in miles}}{5} = \frac{1}{12} + \frac{1}{6}$;

$\therefore \frac{\text{distance in miles}}{20} = \frac{1}{4}$;

$\therefore$ distance = 5 miles.

(931) 1864, 1868, 1872 were leap years;
number of days in 11 years = 4015
add 3 for the leap years = 3

$$4018$$

deduct from Nov. 16 to March 3 = 106

$$7\,\underline{)3912}$$

$$558\tfrac{6}{7}$$

and since he begins taking the paper on a Monday, the fraction may be taken as a whole week;

∴ he pays 559 sixpences, or, £13. 19*s*. 6*d*.

(932) *A*, *B*, *A* and *C* contribute £1390 + £1500;
B and *C* contribute £1590;
∴ twice *A*'s contribution is £1300;
hence *A* contributes £650, *B* £740, *C* £850, *D* £960;
∴ *A*'s share of gain = $\frac{65}{320}$ of £1152 = £234;
B's share of gain = $\frac{74}{320}$ of £1152 = £266. 8*s*.;
C's share of gain = $\frac{85}{320}$ of £1152 = £306;
D's share of gain = $\frac{96}{320}$ of £1152 = £345. 12*s*.

(933) Money from sale = £92 × $11\frac{1}{2}$ = £1058;
original income = £11·5 × 4 = £46;
∴ income from 4 per cents. = £56;
∴ price = £$\frac{1058 \times 3\frac{1}{2}}{56}$ = £$\frac{529}{8}$ = £$66\frac{1}{8}$.

(934) From *A* to *B* takes $\frac{1}{2}$ of 7 hr., or, $3\frac{1}{2}$ hr.;
∴ from *B* to *A* takes $5\frac{1}{4}$ hr. − $3\frac{1}{2}$ hr., or, $1\frac{3}{4}$ hr.;
∴ from *C* to *A* takes 2 × $1\frac{3}{4}$ hr., or, $3\frac{1}{2}$ hr.

(935) 40 (number of pence + 5) = number of nuts;
50 (number of pence − 10) = number of nuts;
∴ 40 times number of pence + 200 = 50 times number of pence − 500;
∴ 10 times number of pence = 700;
∴ number of pence = 70.

(936) In 13 days 54 men dig (81×13) ft., or, 1053 ft.;
in 11 days $(1889 - 1053)$ ft., or, 836 ft. are dug;
$\therefore$ in 1 day 46 men and 8 boys dig 76 ft.;
now 1 man can dig $\frac{81}{54}$ ft., or, $\frac{3}{2}$ ft. in a day;
$\therefore$ 46 men can dig 69 ft. in a day;
$\therefore$ the 8 boys dig $(76 - 69)$ ft., or, 7 ft.

(937) Superficial area of wall $= (324 \times \frac{11}{3})$ sq. ft.,
or, (108×11) sq. ft.;
$$\because \text{ cost} = £\frac{108 \times 11 \times 14\frac{2}{3}}{272\frac{1}{4}} = £\frac{36 \times 11 \times 44 \times 4}{1089} = £64.$$

(938) $\frac{24}{240}$ of *A*'s income $= \frac{16}{240}$ of *B*'s income $+ £9\frac{1}{6}$;
and since their incomes are equal,
$\frac{8}{240}$ of *A*'s income $= £9\frac{1}{6}$;
$\therefore$ *A*'s income $= £275$.

(939) $$\text{Average depth} = \frac{4 \text{ ft. } 6 \text{ in.} + 5 \text{ ft. } 3 \text{ in.}}{2} = 4 \text{ ft. } 10\tfrac{1}{2} \text{ in.};$$
$\therefore$ content $= (270 \times 2\frac{1}{12} \times \frac{117}{72})$ cub. yd.
$= \frac{45 \times 25 \times 13}{4 \times 4}$ cub. yd.;
$\therefore$ cost $= \frac{45 \times 25 \times 13 \times 15}{16}d. = \frac{219375}{16}d. = £57.\ 2s.\ 6\frac{15}{16}d.$

(940) *A* runs $(6 \times \frac{1}{3} + \frac{1}{6})$ miles, or, $\frac{13}{6}$ miles while
B runs $(5 \times \frac{1}{3} + \frac{1}{6})$ miles, or, $\frac{11}{6}$ miles;
$\therefore$ when *A* has finished the 3 mile course, *B* has run $\frac{11}{13}$
of 3 miles;
$\therefore$ *B* loses by $\frac{2}{13}$ of 3 miles, or, $\frac{6}{13}$ of a mile.

(941) $\frac{2253213}{267} = 8439$; $\frac{2253213000}{267} = 8439000$;
$\frac{2253 \cdot 213}{267} = 8 \cdot 439$.

(942) $\frac{64775}{990} \div \frac{25}{900} = \frac{64775 \times 900}{990 \times 25} = \frac{25910}{11}$;
$\frac{64775}{990} \times \frac{25}{900} = \frac{1610 \cdot 375}{891} = 1 \cdot 817\ldots.$

(943) $\frac{725}{9900}$ of 1287 po. = $\frac{29\times13}{4}$ po. = $\frac{377}{4}$ po. = 94·25 po.;
·012625 × 160 po. = 2·02 po.;
and (94·25 + 2·02 − ·02) po. = 96·25 po.
= 2 ro. 16·25 po.

(944) The sum of their ages 10 years ago was 60 years;
60 divided in the proportion of 7 to 5 gives 35 and 25;
∴ their present ages are 45 and 35.

(945) 210 and 665 are both divisible by 35;
∴ 201 men and 335 boys do as much in 6 days as
70 men and 96 boys do in 19 days;
∴ 6 × 201 men and 6 × 335 boys do as much as
19 × 70 men and 19 × 96 boys;
∴ 1206 men and 2010 boys do as much as 1330 men
and 1824 boys;
∴ 186 boys do as much as 124 men;
∴ 3 boys do as much as 2 men;
∴ a man's work : a boy's work = 3 : 2.

(946) $\frac{1}{8}+\frac{1}{10}=\frac{9}{40}$; and ∴ $\frac{31}{40}$ of his income = £473. 13*s.* 1*d.*
∴ his income = $\frac{40}{31}$ of £473. 13*s.* 1*d.* = £611. 3*s.* 4*d.*

(947) *A*'s income-tax = $\frac{4}{5}$ of £9. 1*s.* 3*d.* = £7. 5*s.*;
∴ *A*'s income = $\frac{240}{5}$ of £7. 5*s.* = £348.

(948) Length of course = (1760 + 995) yd. = 2755 yd.;
sound travels along this distance in $\frac{2755\times3}{1140}$ sec.;
the quicker boat goes $\frac{6}{29}$ mile an hour, or, $\frac{6\times1760\times3}{29\times60\times60}$
feet a second faster than the slower boat, and it
will therefore be ahead of the slower boat
$\frac{2755\times3}{1140}\times\frac{6\times1760\times3}{29\times60\times60}$ ft., or, $2\frac{1}{5}$ ft.

(949) At 2.45 P.M. the up train is 25 miles on the road;
we have therefore to divide 55 miles in the proportion of 41 : 25;
∴ when the trains meet down train has travelled $\frac{41}{66}$ of 55 miles, or, $\frac{41 \times 5}{6}$ miles;
∴ down train has travelled $\frac{5}{6}$ of an hour;
∴ the time is (2.45 + 0.50) P.M., or, 3.35 P.M.

(950) In $24\frac{3}{4}$ hours the clock lost 12 minutes;
from 11.30 P.M. on Nov. 29 to 1.45 P.M. on Dec. 7 there are $182\frac{1}{4}$ hours;
∴ time lost $= \frac{182\frac{1}{4} \times 12}{24\frac{3}{4}}$ min. $= \frac{729}{99}$ min. = 1 hr. $28\frac{4}{11}$ min.

(951)

	£	s.	d.	
4*s*. is $\frac{1}{5}$ of £1	1726	4	0	= dividend at £1 in the £
4*d*. is $\frac{1}{12}$ of 4*s*.	345	4	$9\frac{3}{5}$	= .... 4*s*. ....
1*d*. is $\frac{1}{4}$ of 4*d*.	28	15	$4\frac{4}{5}$	= .... 4*d*. ....
$\frac{1}{2}$*d*. is $\frac{1}{2}$ of 1*d*.	7	3	$10\frac{1}{5}$	= .... 1*d*. ....
$\frac{1}{4}$*d*. is $\frac{1}{2}$ of $\frac{1}{2}$*d*.	3	11	$11\frac{1}{10}$	= .... $\frac{1}{2}$*d*. ....
	1	15	$11\frac{11}{20}$	= .... $\frac{1}{4}$*d*. ....
	£386	11	$11\frac{1}{4}$	= dividend at 4*s*. $5\frac{3}{4}$*d*. in the £

(952) $\frac{\frac{34}{9} \times \frac{18}{17} + 4\frac{1}{12} - 3\frac{9}{16}}{5\frac{1}{9} - \frac{63 \times 20}{8 \times 567} + \frac{1}{3}} = \frac{4 + 4\frac{1}{12} - 3\frac{9}{16}}{5\frac{4}{9} - \frac{5}{18}} = \frac{4\frac{25}{48}}{5\frac{1}{6}} = \frac{7}{8}$;
$\frac{11 \times 7}{3 \times 29} \times \frac{29 \times 39}{8 \times 7} - 17\frac{3}{4} = \frac{143}{8} - \frac{71}{4} = \frac{1}{8}$;
$\frac{7}{8} + \frac{1}{8} = 1$.

(953) Area of pond = 82354 sq. ft.;
area occupied by water = (82354 − 288) sq. ft.
= 82066 sq. ft.;
∴ number of gall. $= \frac{82066 \times 144 \times 18}{277\frac{1}{4}} = 767232$.

(954) When 4*d*. is paid out of £1, 236 pence remain;
∴ income-tax = $\frac{4}{236}$ of £476. 18*s*. 4*d*. = £8. 1*s*. 8*d*.

(955) *A*'s wages for $22\frac{1}{2}$ days with *B*'s wages for $22\frac{1}{2}$ days are equal to *A*'s wages for $22\frac{1}{2}$ days with *A*'s wages for $16\frac{1}{14}$ days;

∴ *A*'s wages for $16\frac{1}{14}$ days = *B*'s wages for $22\frac{1}{2}$ days;

∴ *A*'s wages for $38\frac{4}{7}$ days = *B*'s wages for $\dfrac{22\frac{1}{2} \times 38\frac{4}{7}}{16\frac{1}{14}}$ days, or, 54 days.

(956) *B* runs 280 yd. while *C* runs 266 yd.;

∴ *B* runs 100 yd. while *C* runs $\frac{266 \times 100}{280}$ yd., or, 95 yd.;

∴ *B* can beat *C* by 5 yd.

(957) Put *C* for the length of the course in yards;

in 4 minutes the losing boat goes $(C - 1140)$ yd.;

in $6\frac{3}{4}$ minutes the losing boat goes $(C - 40)$ yd.;

$$\therefore \frac{C - 1140}{4} = \frac{C - 40}{6\frac{3}{4}}, \text{ or,}$$

$$\therefore \frac{C - 1140}{4} = \frac{4(C - 40)}{27},$$

or, $27\,C - 30780 = 16\,C - 640$;

∴ $11\,C = 30140$, ∴ $C = 2740$;

also, speed of winning boat in miles per hour

$$= \frac{2740 \times 60}{6\frac{3}{4} \times 1760} = 13\tfrac{83}{99}.$$

(958) The clock loses $9\frac{4}{9}$ min. in $106\frac{1}{4}$ hr.;

the clock loses $1\frac{4}{9}$ min. in $\dfrac{106\frac{1}{4} \times 1\frac{4}{9}}{9\frac{4}{9}}$ hr., or, $16\frac{1}{4}$ hr.;

∴ the time is 3 P.M. on Dec. 3.

(959) In 15 minutes *B* will fill half the cistern;

∴ *A* must run $\frac{25}{2}$ min., or, $12\frac{1}{2}$ min.

(960) 4 × (income − £450) = 6 (£500 − income);

∴ 4 × income − £1800 = £3000 − 6 × income;

∴ 10 × income = £4800, or, income = £480.

(961) $\frac{38825}{900} \times \frac{2325}{990} = \frac{38825}{900} \times \frac{775}{330} = \frac{30089 \cdot 375}{297}$
$= 101 \cdot 310 \ldots\ldots$

(962) $\frac{25715300}{151} = 170300$; $\frac{25715 \cdot 3}{151} = 170 \cdot 3$;
$\frac{257153}{151} = 1703$.

(963) Sum of all the rates $= 16s.\ 0\frac{1}{2}d. = 192\frac{1}{2}d.$
∴ rateable value of house $= £\frac{7700}{192\frac{1}{2}} = £40$.

(964) Content of cistern $= \frac{5 \times 20 \times 112 \times 16}{1000}$ cub. ft.
$= \frac{56 \times 16}{5}$ cub. ft.;
∴ $5\frac{5}{7} \times$ square of length $= \frac{56 \times 16}{5}$ cub. ft.;
∴ square of length $= \frac{7 \times 56 \times 16}{35 \times 5}$ sq. ft.;
∴ length $= 5\frac{3}{5}$ ft. = breadth.

(965) Since $3\frac{1}{3}$ times the original number of occupants have to live on provisions which would have lasted the original number 90 days, the store will last $(90 \div 3\frac{1}{3})$ days, or, 27 days.

(966) Price of stock $= £\frac{2700 \times 3\frac{1}{2}}{105} = £\frac{1350}{15} = £90$.

(967) *A*'s wages : *B*'s wages $= \frac{245}{3} : \frac{245}{4} = 4 : 3$;
∴ *A*'s wages + *B*'s wages $= \frac{7}{3}$ of *B*'s wages;
∴ time required $= \frac{3}{7}$ of $81\frac{2}{3}$ days $= 35$ days.

(968) *A* runs 200 yd. while *B* runs 190 yd.;
B runs 200 yd. while *C* runs 190 yd.;
∴ *B* runs 190 yd. while *C* runs $\frac{190 \times 190}{200}$ yd.;
∴ *A* runs 400 yd. while *C* runs $\frac{190 \times 190 \times 2}{200}$ yd., or, 361 yd.;
∴ *A* can beat *C* by 39 yd.

(969) In $8\frac{2}{5}$ min. *B* can fill $\frac{1}{30}$ of $8\frac{2}{5}$, or, $\frac{7}{25}$ of the cistern;
∴ *A* has to fill $\frac{18}{25}$ of the cistern;
∴ time required $= (\frac{18}{25} \div \frac{1}{25})$ min. $= 18$ min.

(970) In the last 4 years he saves £200 + £120, or, £320;
$\therefore$ his income $-\frac{9}{10}$ (his income + £40) = £80;
$\therefore$ $\frac{1}{10}$ of his income $-$ £36 = £80;
$\therefore$ his income = £1160.

(971) $\frac{3}{2} \times \frac{14}{5} + \frac{55 \times 4}{8 \times 11} + 5\frac{1}{2} + \frac{\cdot 77\dot{3}}{1 \cdot \dot{5}} = \frac{21}{5} + \frac{5}{2} + \frac{11}{2} + \frac{696 \times 9}{900 \times 14}$
$= 12 + \frac{1}{5} + \frac{87}{175} = 12\frac{122}{175}$.

(972) Number of half-crowns + $\frac{5}{2}$ × number of half-crowns
+ 5 × number of half-crowns = 102;
$\therefore$ $\frac{17}{2}$ × number of half-crowns = 102;
$\therefore$ number of half-crowns = 12;
$\therefore$ number of shillings = 30,
and number of sixpences = 60.

(973) $\frac{160 \text{ mètres}}{167 \text{ feet}} = \frac{22}{7}$;
$\therefore$ 1 mètre $= \frac{22 \times 167}{7 \times 160}$ ft. $= \frac{11 \times 167}{7 \times 80}$ ft. $= 3 \cdot 28035 \ldots\ldots$

(974) Half the soldiers with half the navvies do $\frac{1}{8}$ daily;
all the soldiers with half the navvies do $\frac{1}{7}$ daily;
$\therefore$ half the soldiers do $\frac{1}{56}$ daily;
$\therefore$ half the navvies do $(\frac{1}{8} - \frac{1}{56})$, or, $\frac{6}{56}$ daily;
$\therefore$ the navvies do 6 times as much as the soldiers.

(975) £7. 19*s*. $7\frac{1}{2}$*d*. is the interest on £63. 17*s*.
(see Question 665);
£7. 19*s*. $7\frac{1}{2}$*d*. = $1915\frac{1}{2}$*d*., and £63. 17*s*. = 3831*d*.;
$\therefore$ rate per cent. $= \frac{100 \times 1915\frac{1}{2}}{3831} = 6\frac{1}{4}$;
again, £$12\frac{1}{2}$ is the discount on £$113\frac{1}{2}$ for 2 years;
$\therefore$ sum required = £$\frac{112\frac{1}{2} \times 63\frac{17}{20}}{12\frac{1}{2}}$ = £574. 13*s*.

(976) Cost price = 5200*d*. + 600*d*. = 5800*d*.;
selling price = 6000*d*. + 700*d*. = 6700*d*.;
$\therefore$ gain = 900*d*.;
$\therefore$ gain per cent. $= \frac{900 \times 100}{5800} = \frac{450}{29} = 15\frac{15}{29}$.

(977) Value to be put on a stone of flour $= \frac{14\times 27}{13\frac{1}{2}}d. = 2s.\ 4d.$

(978) 5 men = 10 boys, and 10 men = 20 boys;
then if 17 boys reap 125 acres in 15 days;
1 boy reaps 1 acre in $\frac{15\times 17}{125}$ days;
23 boys reap 75 acres in $\frac{15\times 17\times 75}{23\times 125}$ days, or, $6\frac{15}{23}$ days.

(979) 1 kilogramme = weight of $\frac{1}{1000}$ cub. mèt. of water

$= \text{weight of } \frac{(\frac{5}{8000})^3}{1000}$ cub. miles of water

$= \text{weight of } \frac{(\frac{5}{8000}\times 1760\times\frac{3}{6})^3}{1000}$ cub. fathoms of water

$= \frac{(\frac{5\times 11}{100})^3\times 6\times 20\times 112}{1000}$ oz. avoirdupois

$= \frac{1331\times 6\times 20\times 112}{20\times 20\times 20\times 1000}$ oz. avoirdupois

$= \frac{27951}{12500}$ oz. avoirdupois;

∴ the ratio is 27951 : 12500.

(980)	6		267·000000000
			216
18	4	10800	51000
		736	
		11536	46144
		16	
192	3	1228800	4856000
		5769	
		1234569	3703707
		9	
1929	9	124034700	1152293000
		173691	
		124208391	1117875519
			34417481

∴ cube root is 6·439...

(981) $\dfrac{\frac{45}{8} \times \frac{3}{2}}{\frac{6\times5}{5\times9} \times \frac{3}{31}} \times \frac{2}{5} \times \dfrac{\frac{3\times37}{2\times9}}{\frac{111}{8} \times \frac{16}{3}} = \frac{45\times3\times31}{8\times2\times2} \times \frac{2\times37\times8}{5\times2\times111\times16}$
$= 4\frac{23}{64}$.

(982) Interest on £10666. 13*s.* 4*d.* = £$\frac{32000}{3\times20}$ = £533. 6*s.* 8*d.*;
interest on £10800 = £$\frac{10800}{20}$ = £540;
interest on £10935 = £$\frac{10935}{20}$ = £546. 15*s.*;
interest on £11071·6875 = £$\frac{11071\cdot6875}{20}$
= £553·584375
= £553. 11*s.* $8\frac{1}{4}$*d.*

(983) The land in the northern hemisphere is $\frac{3}{4}$ of $\frac{1}{4}$ of the whole earth, or, $\frac{3}{16}$ of the whole earth, and therefore $\frac{3}{8}$ of the northern hemisphere;
and the land in the southern hemisphere is $\frac{1}{4}$ of $\frac{1}{4}$ of the whole earth, or $\frac{1}{16}$ of the whole earth, and therefore $\frac{1}{8}$ of the southern hemisphere.

(984) In 1 acre there are $\frac{4840}{40}$, or, 121 saplings;
the value of each is 1*s.* 3*d.* + 15 times 1*s.* 3*d.*, or, £1;
∴ the whole value is £121.

(985) 1 apple costs $\frac{2}{5}$*d.*;
1 plum costs $\frac{8}{25}$*d.*;
1 pear costs $\frac{14}{15}$*d.*;
1 apricot costs $\frac{7}{4}$*d.*;
now the L. C. M. of 5, 25, 15 and 4 is 300;
∴ I must buy 300 of each fruit, and they cost me
(120 + 96 + 280 + 525)*d.*, or, 1021*d.*,
or, £4. 5*s.* 1*d.*

(986) When the elder boy runs 100 yd. the younger runs $\frac{10\frac{1}{2} \times 100}{13}$ yd., or, $\frac{1050}{13}$ yd., or, $80\frac{10}{13}$ yd., and therefore the younger must have a start of $19\frac{3}{13}$ yards.

(987) He has to pay for interest £$(10 \times 4\frac{1}{2} \times 2\frac{1}{2})$,
or, £112. 10*s.*;
he receives £$(1000 \times 12\frac{1}{2} \times 2\frac{1}{2})$, or, £312. 10*s.*;
∴ he gains £200.

(988) Area of sides = $\{ (42 + 31) \times 10 \}$ sq. ft.
= 730 sq. ft.;
area of windows = $(3 \times 8\frac{1}{3} \times 4\frac{1}{2})$ sq. ft. = $112\frac{1}{2}$ sq. ft.;
area of doors = $(4 \times 6\frac{1}{2} \times 3\frac{1}{4})$ sq. ft. = $84\frac{1}{2}$ sq. ft.;
area of fireplace = (6×4) sq. ft. = 24 sq. ft.;
area of skirting = $(54 \times 1\frac{2}{3})$ sq. ft. = 90 sq. ft.;
∴ area to be papered = $(730 - 311)$ sq. ft. = 419 sq. ft.;
∴ cost = 419*d.* = £1. 14*s.* 11*d.*

(989) £38. 8*s.* is the interest on £640 for a year and a half;
∴ interest on £100 for $1\frac{1}{2}$ years = £$\frac{38 \cdot 4 \times 100}{640}$ = £6;
∴ the rate per cent. is 4.

(990) *A* demands for his sheep £$(59 \times 2\frac{5}{8})$, or, £154. 17*s.* 6*d.*;
B has to get for his beer £154. 17*s.* 6*d.* – £98. 3*s.* 6*d.*,
or, £56. 14*s.*;
B has (36×18) gallons of beer, or, 648 gallons;
∴ price = $\frac{\pounds 56.\ 14s.}{648}$ = 1*s.* 9*d.*;
∴ he must raise his price 3*d.* a gallon.

	£	s.	d.	
(991)	1	6	8	= cost of 1 ton
			5	
10 cwt. is $\frac{1}{2}$ of 1 ton	6	13	4	= cost of 5 tons
2 cwt. is $\frac{1}{5}$ of 10 cwt.		13	4	= ...... 10 cwt.
2 qr. is $\frac{1}{4}$ of 2 cwt.		2	8	= ...... 2 cwt.
14 lb. is $\frac{1}{4}$ of 2 qr.			8	= ...... 2 qr.
			2	= ...... 14 lb.
	£7	10	2	= cost of 5 tons 12 cwt. 2 qr. 14 lb.

(992) Find the L. C. M. of the numbers, omitting 2, 3, 4, 5, 6.

$$\begin{array}{r|l} 2 & 8,\ 9,\ 10,\ 11,\ 12 \\ \hline 2 & 4,\ 9,\ 5,\ 11,\ 6 \\ \hline 3 & 2,\ 9,\ 5,\ 11,\ 3 \\ \hline & 2,\ 3,\ 5,\ 11,\ 1 \end{array}$$

∴ L. C. M. is 72 × 55, or, 3960.

(993) 1 pint contains $\frac{277\cdot27}{8}$ cub. inches, or, $\frac{277\cdot27}{8\times1728}$ cub. ft.;
∴ 1 pint weighs $\frac{277\cdot27\times62\cdot42}{8\times1728}$ lb., or, $\frac{277\cdot27\times31\cdot21}{4\times1728}$ lb.,
or, $\frac{8653\cdot5967}{6912}$ lb., or, 1·25.... lb.

(994) 15 men and 30 children get £(177 − 60), or, £117;
∴ 1 man and 2 children get £$\frac{117}{15}$;
and 1 man and 1 child get £6;
∴ 1 child gets £$\frac{117-90}{15}$, or, £1. 16*s.*;
hence 1 man gets £4. 4*s.*, and 1 woman gets £3.

(995) Cost of 72 dozen = (12 × 84 + 60 × 48)*s.* = 3888*s*;
selling price of 72 dozen = (72 × 72)*s.* = 5184*s.*;
∴ he gains 1296*s.*;
∴ gain per cent. = $\frac{1296\times100}{3888} = \frac{100}{3} = 33\frac{1}{3}$.

(996) At end of 1st season he has 160 + 80 + 120,
or, 360 sheep;
at end of 2nd season he has 360 + 80 + 120,
or, 560 sheep;
at end of 3rd season he has 560 + 80 + 120 + 40 + 60,
or, 860 sheep.

(997) He has to realise £(120 + 12·5 + 625 + 62·5),
or, £820;
∴ he must gain per head £$\frac{820-625}{50}$, or, £3. 18*s.*

(998) At first 460 rub. = 920 fr. = £40;
afterwards 460 rub. = 690 fr. = £28. 15*s.*;
∴ he gains £11. 5*s.*

(999) 4285 − (2540 + 980) = 765, the number of grains of soda and potash that take up 980 grains of the sulphuric acid;

hence $\frac{49 \times \text{number of gr. of soda}}{32}$

$$+ \frac{49 \times (765 - \text{number of gr. of soda})}{48} = 980;$$

or, 3 × number of gr. of soda + 2 × (765 − number of gr. of soda) = 20 × 96;
∴ number of gr. of soda = 1920 − 1530 = 390;
∴ number of gr. of potash = 765 − 390 = 375.

(1000) Cost of second house = $\frac{8}{3}$ of £500 = £$\frac{4000}{3}$;
∴ cost of first house = $\frac{3}{2} \times \frac{2}{1} \times \frac{4}{3} \times \frac{60}{40} \times$ £$\frac{4000}{3}$
= £8000.

THE END.

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INDEX

PAGE
ABBOTT (E.), Arnold's Greek Prose 23
— Elements of Greek Accidence 23
— Essays on Aristotle 3
— Hellenica 27
— Selections from Lucian 24
— and Mansfield (E.D.), Primer of Greek Grammar 21
Acland (A.), Political Hist. of Eng. 10
Alford (Dean) Greek Testament 29
Aristophanes 25, 28
Aristotle's Ethics 28
— Organon. By J. R. Magrath 28
— Essays on. By Abbott 1
Arnold (T. K.) Cornelius Nepos 20
— Crusius' Homeric Lexicon 26
— Demosthenes 27
— Eclogæ Ovidianæ 18
— Eng. Greek Lexicon 29
— First French Book and Key 34
— First German Book and Key 33
— First Greek Book and Key 22
— — revised by F. D. Morice 22
— First Hebrew Book and Key 35
— First Verse Book and Key 16
— Greek Accidence 22
— Greek Prose Comp. and Key 22
— — revised by E. Abbott 23
— Henry's First Latin and Key 16
— — revised by C. G. Gepp 16
— Homer's Iliad 26
— Latin Prose Comp. and Key 17
— — revised by G. G. Bradley 17
— Madvig's Greek Syntax 22
— Sophocles 28

BACON'S Essays. By F. Storr 2
Baker (W.), Manual of Devotion 32
Barbier (P.), French Reader 34
Barrett (W. A.), Chorister's Guide 35
— Form and Instrumentation 35
Belcher (H.), Livy, Book II. 2
Bennett (G. L.), Cæsar's Gallic War 15
— Easy Latin Stories and Key 15
— First Latin Exercises 14
— First Latin Writer and Key 14
— Latin Accidence 14
— Second Latin Writer and Key 14
— Second Latin Reader 3
— Vergil, Selections from 17
— Works by 37
Bigg (C.), Latin Prose Exercises 18
— Thucydides, Books I. II. 28
Blunt (J. H.), Household Theology 32
— Keys to Christian Knowledge 31
Bowen (E. E.), Campaigns of Napoleon 34
Bradley (G. G.), Arnold's Latin Prose 17
— Lectures in Latin Prose 2
Bridge (C.), French Literature 9
Bright (J. F.), History of England 8
Brooke (E. P.), Jugurtha of Sallust 2
Building Construction, Notes on 11
Burton (J.), English Grammar 5

CÆSAR 15, 16, 19
Calvert (E.), Selections from Livy 20
Carr (A.), Notes on St. Luke 29

PAGE
Catena Classicorum 30
Cicero de Amicitia 18
Clarke (A. D.), Examination Papers 13
Cornelius Nepos. By T. K. Arnold 20
Cornish (F. W.), Oliver Cromwell 10
Courtney (W. L.), Philosophical Subjects 2
Crake (A. D.), History of the Church 10
Creighton (L.), First Hist. of Eng. 8
— Historical Biographies 10
Crusius (G. C.), Homeric Lexicon 26
Curteis (A. M.), The Roman Empire 9

DALLIN (T.), Materials and Models 19, 24
Davys (Bishop), History of England 10
Dawe (C. J. S.), Latin Exercise Bk. 15
— Study of Church Catechism 32
Demosthenes 27

ENGLISH School-Classics 6, 7
Euripides, Scenes from 25

FRADERSDORFF, Eng.-Greek Lex. 29
Firman (F. B.), Zeugma 24

GANTILLON (P. J. F.), Exam. Papers 19, 24
Gedge (J. W.), Com. to Prayer Book 31
Gepp (C. G.), Arnold's Henry's First Latin Book 16
— Latin Elegiac Verse 16
— Latin-English Dictionary 19
— Virgil 17
— Works by 38
Girdlestone (W. H.), Arithmetic 13
Goethe's Faust 33
Goolden (W. T.), Intro. to Chemistry 11
Goulburn (Dean), Confirmation 31
Greek Antiquities, Study of 3
Green (A. H.), Geology for Students 11
— (W. C.), Aristophanes 28
Grenfell (E. F.), German Exercises 33
Gross (E. J.), Algebra, Part II. 12
— Kinematics and Kinetics 12

HARDY (E. G.), Antiq. of Greece 27
Hauff's Stories, Selections from 33
Heatley (H. R.), Gradatim 15
— Latin Translation Book 2
Hellenica, Essays 27
Herodotus, Stories from, Phillpotts 24
— By H. G. Woods 27
Hertz (H. A.), Short Readings 5
Heslop (G. H.), Demosthenes 27
Historical Biographies 10
Historical Handbooks 9
Holmes (A.), Demosthenes 27
— Rules of Latin Pronunciation 15
Homer's Iliad 26
Horace. By J. M. Marshall 20

IOPHON 24
Isocrates. By J. E. Sandys 27

JEBB (R. C.), Sophocles 28
Jennings (A. C.), Ecclesia Anglicana 2
Juvenal. By G. A. Simcox 20

KEYS TO CHRISTIAN KNOWLEDGE 31
— List of 4
Kitchener (F. A.), A Year's Botany 11

INDEX.

PAGE

Kingdon (H. N.), Gradatim 15
— Latin Translation Book 2

LATIN TEXT BOOKS 16
La Fontaine's Fables. By P. Smith 34
Lang (L. B), Geography for Beginners 35
Laughton (J.), At Home and Abroad 35
Laun (Van, H), French Selections 34
Lessing's Fables. By F. Storr 33
Livy, Selections from 20
— Book II. By H. Belcher 2
Lucian, Selections from 24

MACBETH (J.), Church Principles 32
Madvig's Greek Syntax 22
Magrath (J. R.), Aristotle's Organon 28
Maguire (T. M.), Test Questions 10
Mann (J. S.), Antiquities of Greece 27
Mansfield (E. D.), Latin Sentence 19
— Primer of Greek Syntax 21
Manuals of Religious Instruction 31
Marshall (J. M.), Horati Opera 20
Merryweather (J. H.), Cæsar 19
Moberly (C. E.), Alexander the Great 26
— Geography 35
— Shakspere's Plays 5
— Xenophon's Memorabilia 25
Moore (E.), Aristotle's Ethics 28
Moore (E. H.), Greek Method 21
— Selections from Thucydides 3
Morice (F. D.), Stories in Attic Greek 25
— Arnold's First Greek Book 22
Morshead (E. D.), Goethe's Faust 33
Mullins (W. E.), Hauff's Stories 33

NAPOLEON'S Campaigns 34
Norris (J. P.), New Testament 32
— Confirmation 31
— Keys to Christian Knowledge 31
— Rudiments of Theology 32

OVIDIANÆ Eclogæ. By Arnold 18
Ovid, Stories from. By R. W. Taylor 18

PAPILLON (T. L.), Terenti Comœdiæ 20
Pearson (C. H.), English History 9
Percival (J.), Helps for School Life 31
Persius. By A. Pretor 20
Phillpotts (J. S.), Homer's Iliad 26
— Shakspere's Tempest 5
— Stories from Herodotus 24
Powell (F. York), English History 8
Pretor (A.), Persii Satiræ 20
Priestland (E.), Greek Prepositions 23

RANSOME (C.), Political Hist. of Eng. 10
Reid (J. S.), Greek Antiquities 3
— History of the Romans 9
Reynolds (S. H.), Iliad of Homer 26
Richardson (G.), Conic Sections 12
Rigg (A.), Intro. to Chemistry 11
Ritchie (F.), First Steps in Latin 15
— Practical Greek Method 21
Rivington's Mathematical Series 12, 13
Rogers (J. E. T.), Aristotle's Ethics 28

SANDERSON (L.), Zeugma 24
Sandys (J. E.), Isocratis Orationes 27
Sargent (J.), Materials and Models 19, 24
Schoemann's Antiquities of Greece 27
Shakspere's Plays 5
Sidgwick (A.), Cicero de Amicitia 18
— First Greek Writer 22
— Greek Prose Composition 22
— Greek Verse Composition 2
— Homer's Iliad 26
— Scenes from Greek Plays 25
— Works by 37
Simcox (G. A.), Juvenalis Satiræ 20
— Thucydides 28
— (W. H.), Taciti Historiæ 20
Smith (J. Hamblin), The Acts 29
— Algebra and Key 12
— Algebra, Exercises on 12
— Arithmetic and Key 12
— Book of Enunciations 13
— English Grammar 5
— Geometry and Key 13
— Greek Grammar 23
— Heat, The Study of 13
— Hydrostatics and Key 12
— Latin Grammar 16
— — Prose Composition and Key 18
— Statics and Key 12
— St. Mark's Gospel 29
— Trigonometry and Key 12
— Works by 36
— (P. Bowden), La Fontaine's Fables 34
— (P. V.), English Institutions 9
— (R. Prowde), Latin Prose Ex. 15
Sophocles 28
Storr (F.), Æneid of Vergil 17
— Greek Verbs 23
— Hauff's Stories 33
— Lessing's Fables 33
— Works by 38

TACITUS. By W. H. Simcox 20
Tancock (C. C.), Cæsar 19
Taylor (R. W.), Short Greek Syntax 23
— Stories from Ovid 18
— Xenophon's Agesilaus 25
— Xenophon's Anabasis 25
— Works by 37
Terence. By T. L. Papillon 20
Tidmarsh (W.) English Grammar 5
Thompson (F. E.), Syntax of Attic Greek 3
Thucydides 1, 28
Turner (E. J.) Goethe's Faust 33

VECQUERAY (J.), German Accidence 33
Vergil 16, 17

WAITE (R.), Duke of Wellington 10
Way of Life 32
Whitelaw, Shakspere's Coriolanus 5
Willert (P. F.), Reign of Lewis XI. 9
Wilson's Modern English Law 9
Woods (H. G.), Herodoti Historia 27
Wordsworth (Bp.), Greek Testament 29
Wormell, Principles of Dynamics 13
Worthington's Practical Physics 11

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